ICLT 2014

THE 6th INTERNATIONAL CONFERENCE ON
LOGISTICS AND TRANSPORT 2014 (ICLT 2014)

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"INNOVATION IN GLOBAL SUPPLY CHAIN MANAGEMENT"

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THAMMASAT BUSINESS SCHOOL

Faculty of Engineering

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INNOVATION IN GLOBAL SUPPLY CHAIN MANAGEMENT

ICLT 2014

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INTRODUCTION

This is the 6th international conference organised by the Thai researchers' consortium of Value Chain Management and Logistics (ThaiVCML), the Centre for Logistics Research at Thammasat Business School, Thammasat University and the Faculty of Engineering, Chiang Mai University. This is major event for researchers in transport, logistics, supply chain and value chain management. This year's event in Kuala Lumpur, Malaysia continues with successful conferences held in ChiangMai (Thailand), 2009; Queenstown (New Zealand), 2010; Male (Maldives), 2011; ChiangMai (Thailand), 2012 and Kyoto (Japan), 2013. This year's event is held during 26th – 29th August 2014 which is hosted by Malaysia Institute of Transport (MITRANS), Universiti Teknologi MARA (UiTM).

Under the theme of "Innovation in Global Supply Chain Management", the following topics were welcomed at the conference:

- Procurement & Supply Management
- Planning & Forecasting
- Relationship & Collaboration
- Production Planning & Operations
- Inventory Fulfilment
- International Logistics
- Humanitarian Logistics
- Maritime Logistics
- Logistics Services Providers
- Logistics Development Policies
- Supply Chain Design/Configuration
- Supply Chain Risk
- Sustainable Supply Chain
- Production & Inventory
- Supply Chain Performance
- Global Supply Chain
- Multimodal Transport
- Freight Logistics
- E-Logistics
- Logistics Facilitation

The conference best paper of this year will be specially selected and considered for publication in the International Journal of Physical Distribution and Logistics Management [ABS: 2*, Impact Factor of 2.617] and there will be a special ICLT2014 issue in the International Journal of Logistics Research and Applications [ABS: 2*, Impact Factor of .0357]. The selected papers will undergo future blind review from our scientific committee panel.

WELCOME ADDRESS FROM THE CONFERENCE CHAIRS

On behalf of the organising committee, we would like to welcome all participants to the 6th international conference on Logistics and Transport (ICLT 2014). It has been 6 years since the first conference was hosted in ChiangMai (Thailand). This ICLT conference is expected to continue on an annual basis in order to facilitate the sharing of ideas, research findings, and teaching directions related logistics and supply chain from an academic perspective.

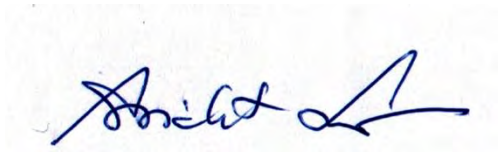
The theme for this year's event is "Innovation in Global Supply Chain Management". This theme is a reflection and an extension of ICLT2013's theme, "Sustainable Supply Chain Management in Asia Pacific" and tries to further explore the growing importance of the topic in today's business world.

"Innovation in Global Supply Chain Management" is an important concept for industries in all scales. It can be seen as a guidance to help in improving companies' resources, capabilities and operational efficiencies through innovations across the entire supply chain continuum. The challenge to harmonise these subtle changes in between each members of the supply chain remains an elusive challenge.

Nonetheless this concept does lead to greater opportunities in reviewing and revising processes, operations, and production activities that can comply with this given paradigm. Other potential advantages of innovation in supply chain management can cost reduction, waste reduction, cycle time reduction, risk mitigation, and asset utilisation.

We would like to sincerely thank all presenters, reviewers, our scientific committees, and keynote speakers for their appreciated contribution. We also apologise in advance if there are any difficulties you may encounter while participating the conference. Finally, we hope that you will enjoy this conference and we hope that the deliberations will be fruitful and successful.

Assoc.Prof. Dr. Ruth Banomyong



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POOLING LOGISTICS AS A MEAN FOR SUSTAINABLE URBAN FREIGHT DISTRIBUTION

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Abstract
By supporting trading activities urban freight distribution contributes to the dynamism of the cities. But policy makers have now to develop new logistics scheme that can minimize its negative impacts. This paper focuses on the consolidation of goods flows by using a Distribution Center. It appears to be a good solution to meet the new objectives of the policy makers: redesigning the flow of goods inside the city while not increasing the cost, reducing pollution and making the city more attractive. To dimension the DC, we have conducted a survey with the main customers of urban logistics services: retailers and store managers. The results of this survey are now used in order to optimize the delivery rounds in the city.

Keywords: Urban freight distribution, logistics pooling, vehicle routing problem

Introduction

The quality of the environment in urban areas is of vital importance. It is one of the main factors that determine whether a city is a healthy place to live, whether people enjoy living there, and whether they want their children to grow up there (EU, 2004). Urban freight distribution plays a major role in supporting trading activities and contributing to the dynamism of the cities but generate at the same time some negative impacts. Some of the main problems associated with increasing urban traffic are the following (Anderson et al., 2005):

- Economic impacts: congestion, inefficiency and resource waste, infrastructure damage.
- Environmental impacts: pollutant emissions, global warming, overconsumption of fuel, etc.
- Social impacts: the physical consequences of pollutant emissions on public health, traffic accidents, noise, etc.

To make cities more sustainable, numerous projects and innovations have been carried out in order to improve urban logistics. The main aims were to reduce motorized traffic and thereby reduce CO2 and greenhouse gas emissions in urban areas mainly by using three issues: consolidation of goods flows; low polluting vehicles; and regulation (Patier et Browne, 2010). Consolidation of goods, mainly based on the use of a distribution centre appears as a good solution to optimize the final delivery inside the city. The Vehicle Routing Problem-VRP can then be used to optimise the route for freight transportation. The traditional VRP is usually based on a homogeneous fleet size problem and many researchers have used these assumptions (Hasle and Kloster, 2007), but Vehicle Routing Problem becomes more complex when the vehicle fleet is heterogeneous, i.e., vehicles differ in their equipment, capacity, and cost (Taillard, 1999). The objective of this paper is to optimize urban freight distribution while taking into consideration the constraints and regulation of the city. Depending on the sum of products to be distributed, the fleet of vehicles has to be adapted in order to reduce the total costs and environmental impact. Thus, the problem that we consider in this paper is a Fleet Size and Mix Vehicle Routing Problem (FSMVRP) that is adapted to the environmental objectives, while focusing on the context of urban freight distribution. The next part of the paper gives an overview of the context of urban freight distribution and introduces the notion of Distribution Center (DC) as a logistics pooling system. Then a model of the Vehicle Routing Problem, using an heterogeneous fleet, and innovative objective functions to optimize cost and CO2 emission is developed. Finally, a case study in a medium city is proposed to validate the optimization model.

Context of Urban Freight Distribution

The main goal of urban freight policies is to improve the efficiency of freight movement in cities in order to increase their vitality while reducing the negative impacts.
Urban Freight Transport involves different actors, such as receivers (shops), shippers or producers (suppliers), transport operators, but also other stakeholders like city authorities, residents or visitors.

These later can be directly impacted by the negative externalities of freight transport activities: traffic congestion, noise, gas emissions, air pollution, etc. Despite the fact that goods transport in cities represents only 10% to 18% of road traffic, it accounts for 40% of air pollution and noise emissions (EU, 2006).

Classification of urban freight solutions
The urban freight distribution projects driven by local authorities mainly concern three areas (Lindholm, 2012):

- Restrictions such as: weight size and type of vehicle, loading and unloading area, time windows for distribution, etc.
- Consolidation of goods including: Hub, Central Distribution Center, Cross Docking Center, special container, etc.
- Infrastructure: concerns alternative ways of transporting goods using for example, rail, canals for waterway transport, trams or underground.

By introducing one more step in the supply chain, a distribution centre leads to additional handling, contractual problems, or loss of security, liability and customer service issues (Browne et al., 2005). Therefore, to encourage transport operators using a distribution centre, an appropriate mix of measures are used together: consolidation centers often work in combination with restriction measures. This paper focuses on optimal distribution of urban freight from a Distribution Centre under the constraints of time window for distribution.

Logistics pooling and consolidation centers
Consolidation appears as one of the key issues to improve urban goods transportation. The design and optimization of logistics scheme, long based on an economic approach; happen today through the integration of environmental and social concerns, in line with the objectives of sustainable development (Rosen and Kishawy, 2012).

Literature on logistics pooling and transport optimization (Cruijssen, 2006), (Ballot and Fontane, 2010), is mainly based on analytical methods and call upon strong hypothesis to simplify the models. They generally consider the case of pallets as shipment unit, full truckload delivery, and routing problem. The demand in most cases is considered as stationary and the delivery of batch of products is organized according to long delays through warehouses and logistics hub. Urban freight transport is different from mass distribution. Shipment units are parcels and cartons, the logistics flow is characterized by a non stationary demand of small quantities, to be distributed the same day or in D+1, to different destinations every day.

When using a distribution center (DC), the objective is to optimize the delivery round for each vehicle starting from the DC. The main constraints are the following:

- The total weight and number of parcels to be delivered, in order to choose the appropriate truck's capacity for each round,
- The number of stores to be delivered in the round, to estimate the duration of the stops,
- The location of the stores, to calculate the distances and estimate time transportation,
- Time slot for delivery at each store, which appears to be a big constraint in the case of urban freight distribution.

Vehicle Routing Problem and Sustainability
The environmental impacts of transport can be reduced by improving the concept of sustainable transportation (Moutaoukil and al., 2013). The term sustainable routing problem is used to describe modes of transport, and systems of transport planning that are consistent with wider concerns of sustainability (Faccio and al., 2013).

To develop the model, we must model the distance in the whole logistics network: between clients themselves, and between platform center (depot) and customers. Thus, the problem is defined as complete graph G(N,A) where N={0}U{1,…,n}U{n+1} defines the set of different nodes and {0} and {n+1} represent the depot and A is the set of arcs between each pair of nodes. The set of customers is represented by Nc ={1,…,n}. For every arc (i,j) in A, the distance between nodes i and j is defined as dij. Arc eij belongs to the set of arcs A and has an associated non-negative costs cij . The demand at the depot is considered to be zero.

An unlimited heterogeneous fleet of vehicles is available. This fleet of vehicles is composed of V = {1, …,K} different vehicle types, each with a different cost and capacity. The following notations are used:

N = number of customers (nodes),
f_k = fixed cost of acquisition / rental of type *k* vehicle
α_k = cost /ton.km of type *k* vehicle,
β_k = cost /km of type *k* vehicle
δ_k = cost /ton of type *k* vehicle
q_i = demand for customer *i,*
d_{ij} = distance of the arc *ij*
C_k^p = capacity (weight) of a type *k* vehicle,
E_{empty}^k = emission of an empty vehicle of type *k,*
E_{full}^k = emission of full truckload of type *k* vehicle,
$E_{manufacturing}(k)$ = manufacturing emission of type *k* vehicle,
$D(k)$= Lifetime in km of type *k* vehicle,
T = Vehicle routes deadline
t^k = Unloading time of type k vehicle;

In addition, the following decision variables are used:
y_{ij}^k *:* flows on arcs *(i, j)* loaded on vehicle of type *k,*
x_{ij}^k *:* 1 if vehicle of type *k* is assigned to *(i, j),* and 0 otherwise.
Z_j^k*:* 1 if type *k* vehicle visit *j*, and 0 otherwise;
t_{ij} *:* Time runs on *(i, j).*

Basic principles for estimating CO2 emission
From the perspective of sustainable development, this section aims to evaluate CO2 emissions within routing problems. As demonstrated in literature (Ubeda et al., 2011), (Figliozzi, 2010), CO2 emissions depend on the weight carried by the truck, on the capacity of the truck that is used, on the distance traveled and the average speed of the truck. The average speed of course depends on the type of path in urban, regional or national routes. We have improved the formula given by [(Jancovici, 2007) and (Hickman et al., 1999)], to calculate the CO2 emissions based on truck type k, by setting the value of the average speed to 20 km/h for urban routes:

$$(g) = \sum_{k \in V} \sum_{(i,j) \in A} d_{ij} * \left[(E_{full}^k - E_{empty}^k) * \frac{y_{ij}^k}{C_k^p} + E_{empty}^k + \frac{E_{manufacturing}(k)}{D\ (\mathrm{k})} \right]$$

We point out that CO2 emissions are not directly related to the weight of the cargo but rather to the actual weight of the used vehicles including their load and their curb weight. This means that the usage of vehicles of adequate size reduce CO2 emissions. The incorporation of a lighter vehicle of course means that the vehicle's payload is reduced. To explore a fleet's ability to carry goods of different sizes, we investigate non homogeneous fleets where vehicles differ by their weight, payload and emissions.

Economic cost of the routing problem
As in some scientific work as in (Liu et al., 2009), the economic function of vehicle trips contains a fixed (depends on vehicle type) and variable cost (which depends on the type of vehicle, distance traveled and amount charged). To calculate the cost of a routing solution, we base on this equation witch is derived from the equation given by the National Road Committee of France (CNR) in their website (cnr.fr):

$$Cost(€) = \sum_{k \in V} \sum_{j \in N} f_k x_{0j}^k + \sum_{k \in V} \sum_{(i,j) \in A} \alpha_k\ d_{ij} y_{ij}^k + \sum_{k \in V} \sum_{(i,j) \in A} \beta_k\ d_{ij} x_{ij}^k + \sum_{k \in V} \sum_{(i,j) \in A} \delta_k\ y_{ij}^k$$

The first part of the economic objective function gives the total fixed cost of the vehicles used and the three others parts give the total variable routing cost. By adding the flow variable in the equation, our

model introduces variable costs related to the load of the vehicle while in most publications, the variable cost is often only related to the distance traveled. Our assumption is closer to real life, where carriers invoice according to traveled distance and loaded weight.

Constraint of the routing problem
From literature, all constraints related to a FSMVRP were adapted, and a time constraint was added for routes. So, the constraints brought to our model are as follows:

$$\sum_{i=0}^{n} x_{ij}^{k} = \sum_{i=0}^{n} x_{ji}^{k}, \forall k \in V, \forall j \in N \quad (2)$$

$$\sum_{i=0}^{n} x_{ij}^{k} = Z_j^k, \forall k \in V, \forall j \in N \quad (3)$$

$$\sum_{k=1}^{m} Z_j^k = 1, \forall j \in Nc \quad (4)$$

$$\sum_{k \in V} \sum_{j \in N} y_{0j}^{k} = \sum_{i \in N} q_i \quad (5)$$

$$\sum_{k \in V} \sum_{j \in N} y_{j0}^{k} = 0 \quad (6)$$

$$y_{ij}^{k} \leq \sum_{k \in V} Q_k x_{ij}^{k}, \forall (i,j) \in A \quad (7)$$

$$\sum_{i=0}^{n} y_{ij}^{k} - q_j * Z_j^k = \sum_{i=0}^{n} y_{ji}^{k}, \forall k \in V, \forall j \in Nc \quad (8)$$

$$t^k \sum_{(i,j) \in A}^{n} x_{ij}^{k} + \sum_{(i,j) \in A}^{n} t_{ji} x_{ji}^{k} \leq T, \forall k \in V \quad (9)$$

$$y_{ij}^{k} \geq 0; \quad t_{ij} \geq 0 \ \forall (i,j) \in A \ \forall k \in V \quad (10)$$

$$y_{ii}^{k} = 0, \forall i \in N, \forall k \in V \quad (11)$$

$$x_{ij}^{k} \in \{0,1\}, \forall (i,j) \in A, \forall k \in K \quad (12)$$

$$Z_i^k \in \{0,1\}, \forall i \in A, \forall k \in K \quad (13)$$

Constraint(2) ensure that a vehicle that arrives at a customer will also be the same type that leaves, while constraints (3) and (4) state that each customer is visited exactly once, so the type of vehicle arriving and leaving one particular customer has to be the same. Constraints (5) and (6) indicate that vehicles are loaded when they leave the depot and must return loaded. In (7), the total load on a trip is constrained not to exceed the capacity of the vehicle assigned to that trip and equation (8) represents the movement of goods assuming that all customer demands must be satisfied. The constraint of max time of a route is represented in (9). Constraints (10) ensures that the flow and time are non-negative and (11) means that there is no flow from a customer to itself; while constraints (12) and (13) define that each arc has the value 1 if it is used and 0 if it is not used by a vehicle of type k.

Case Sudy in a Medium Sized City
Such a project was started in Saint Etienne, a medium size city in France. The objective was to reduce the negative impact of urban freight transport by using a distribution centre located nearby the highway. After a cross docking operation, a limited number of vehicles are delivering the parcels to the customers inside the city. In 2012, a survey was conducted with 100 store managers in the hyper-center of the city in order to identify their logistics activities. The results gave information on the constraints and on the daily and weekly demand at each store such as (Neubert and Moutaoukil, 2013):

- The stores can receive a range from less than 1 receipt per week to more than 4 a day.
- City regulation policies impose that the delivery of the stores must be done before 11 AM.
- 40 % of the stores open between 9 and 10, and 40% after 10. This results in a very short delay, 1 or 2 hours to organize the delivery trips from the DC.

As an example, in a given day, 10 addresses are visited, located around the depot. The demand vector is given by the following table:

Manufacturer	1	2	3	4	5	6	7	8	9	10
Demand (Ton)	0.09	0.11	0.07	0.5	0.7	0.03	0.11	0.06	0.05	0.6

Table 1: Manufacturer's demand

To operate our case study, we used a set of parameters that define the main characteristics of a given vehicle, summarized in the following table:

Category	Type of vehicles	Total authorized weight (ton)	Useful load (ton)	Cost/km	Cost/ton	Fixed Cost	E^k_{Empty} (g/CO_2)	E^k_{full}(g/CO_2)	$E_{manufacturing}$ /k	Unloading time (min)
LDV *	1	<1.5	0.4	0.13	0.037	104.84	58.6	59	6.8	5
	2	1.5-2.5	0.7	0.15	0.04	104.84	68.4	68.4	8.3	7
	3	2.6-3.4	1.2	0.17	0.045	104.84	88	88	10.2	9
HDV **	4	3.5	1.4	0.23	0.05	111.58	100.9	101	10.5	10
	5	3.6-5	2.37	0.29	0.065	111.58	136	196	11.9	13

***LDV:** light duty vehicles ** **HDV:** heavy duty vehicles

Table 2: Parameters of simulation [adapted from CNR and (Jancovici, 2007)]

Case Study Results

For the case study discussed, the model gives different results depending on the optimization criterion. First, the basic scenario with direct deliveries from the depot to the clients has to be assessed. Its evaluation is summarized in table below.

Direct scenario		
Assess-ment	Economic	417,93
	Environmental	4670,6
	Distance travelled	68,22
	Number of routes	10
	Number of vehicles	3 of type 2 and 7 of type 1

Table 3: Direct scenario results

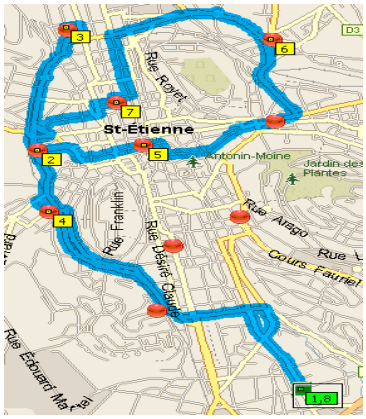
Choosing the economic function to optimize the delivery run, it gives the following results:

Optimization		Economic	
Delay of delivery		2h	1h
Assessment	Economic	*79,431*	*121,89*
	Environmental	2859,9	2687,3
	Distance travelled	27,59	34,62
	Number of routes	2	4
	Visiting Order	Type 3: (0,5,7,1,3,8,6,0) Type 4: (0,10,4,2,9,0)	Type 1: (0,2,7,6,0) Type 2: (0,4,3,9,0) Type 2: (0,10,8,0) Type 3: (0,5,1,0)

Table 4: Economic optimization results

Depending on the deadline for delivery, the economic optimization use different types and number of vehicles. Thus, when the maximum duration for a route is 2h, the delivery process uses two types of vehicles: type 3 and type 4 with one run for each. The total traveled distance of the two routes in this scenario is equal to 27,59 km. However, when we have only 1h for maximum duration, the model uses more vehicles with different types to satisfy clients demand in this tight deadline. Thus, in this case, the model uses 4 vehicles: two of type 2, one of type 1 and one of type 3. This needs more distance to be travelled which is equal to 34,62 km. We see clearly that when the maximum duration for delivery is decreased by one hour, total cost increases from 79,431 to 121,89 and at the same time, CO2 emissions increase from 2859,9 g to 2687,3 g. The economic optimization gives better results than the

direct delivery, whatever the criterion of evaluation. The following figures show geographically different routes:



Route 1: Vehicle type 3

Route 2: Vehicle type 4

Figure 3: Economic Routes with delivery delay T= 2h

Route 1: Vehicle type 1

Route 2: Vehicle type 2

Route 3: Vehicle type 2

Route 4: Vehicle type 3

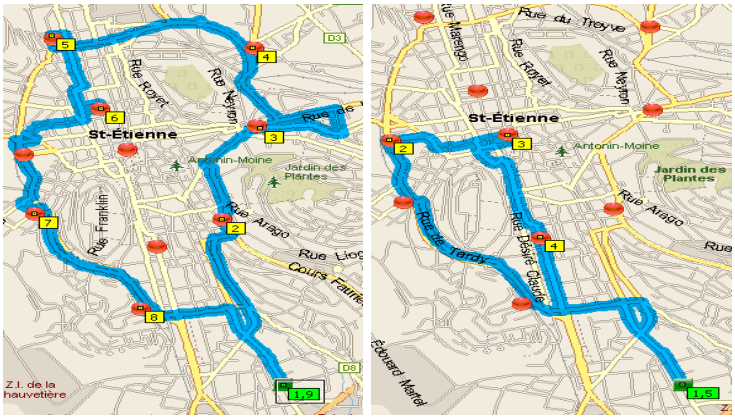
Figure 4: Economic Routes with delivery delay T= 1h

In the case of environmental optimization, the model gives the following results:

Optimization		**Environmental**	
Delay of delivery		2h	1h
Assessment	Economic	86,677	125,15
	Environmental	***2009,8***	***2286,4***
	Distance travelled	19,48	29,4
	Number of routes	2	4
	Visiting Order for each vehicle type	Type 3: (0,9,10,8,7,6,1,2,0) Type 4: (0,5,3,4,0)	Type 1: (0,8,7,6,3,0) Type 2: (0,4,0) Type 2: (0,9,10,0) Type 3: (0,5,1,2,0)

Table 5: Environmental optimization results

The following figures show geographically the different routes:



Route 1: Vehicle type 3 Route 2: Vehicle type 4

Figure 3: Environmental Routes with delivery delay T= 2h

Route 1: Vehicle type 1 Route 2: Vehicle type 2 Route 3: Vehicle type 2 Route 4: Vehicle type 3

Figure 4: Environmental Routes with delivery delay T= 1h

The environmental optimization uses different types of vehicles depending on the delivery deadline. Thus, when the maximum duration is 2h, the model uses two types of vehicles: type 3 and type 4 with one run for each. The total traveled distance of the two routes in this scenario is equal to 19,48 km. However, when we have only 1h of maximum duration, the model uses more vehicles with different types to satisfy clients demand in this tight deadline. Thus in this case, the model uses 4 vehicles: two of type 2, one of type 1 and one of type 3. This needs more distance to be travelled which is equal to 29,4 km. We see clearly that when the maximum duration for delivery is decreased by one hour, CO2 emissions increase from 2009,8 g to 2286,4 g and at the same total cost increases from 86,677 to 125,15 euros. We highlight also that the environmental optimization gives better results than the direct delivery, whatever the criterion of evaluation. Generally, we can conclude that the roads and the number and types of used trucks, depend on the optimization criterion and on the maximum time allotted to the distribution problem.

Conclusion

This paper deals with the problem of urban freight distribution in large cities in European countries. By supporting trading activities it contributes to the dynamism of the cities, but policy makers have now to develop new logistics scheme that can minimize the negative impacts. Many actors have to be considered in such projects, beginning with city traders and retailers who do not want to reduce the quality of service of their actual replenishment. Implementing a Distribution Center often appears as a good solution to meet the new objective of the policy makers: redesigning the flow of goods while not increasing the cost, reducing pollution and making the city more attractive. The experience actually conducted in St Etienne just started. It is based on a detailed analyze of the situation, including

different stakeholders: haulers, citizen, retailers and store managers. This paper shows the impact of the delay for delivery on the economical and environmental performances of a distribution center. The main result is that policy makers should consider at the same time the change in the logistics process, i.e. using a distribution center, and the change in the restriction, i.e. changing deadline for delivery from 11 AM to 12 AM.

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TRADE AND TRANSPORT TRENDS OF FOOD AND LIVE ANIMAL FOR ASIA-EUROPE-AFRICA

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Abstract
In this paper, food and live animal trade and transportation trends for the three continents of Asia, Europe and Africa, AEA, were analyzed. For the study area a multimodal network was defined and deployed. Using pertinent national spatial socioeconomic data, distribution models reflecting international trade models were developed. The models facilitated identification of possible relations between trade and transportation during four decades covering the period of 1965-2005. Preliminary statistical analyses and gravity modeling determined GDP and transportation variables as more significant factors influencing trade among several database candidate variables. The coefficients of gravity models, reflecting the negative elasticity's of trade with respect to transportation, often showed increasing sensitivity or absolute values through time. During the study period, the comparison between optimal trade distributions, based on linear programming, and their observed distributions, showed significant differences. Further study of the AEA food and live animal trades can enhance trade policy development and resource allocation.

Keywords: Food and live animal trade, multimodal transport, trade modeling, gravity modeling, linear programming, Asia, Europe and Africa.

Introduction

Freight transportation plays a key role in trade and economic development. It supports production, trade and consumption activities by ensuring the efficient movement and availability of raw materials, intermediate products and finished goods. Over the years, interest in explicit consideration of commodity and goods movement in the transportation planning has steadily increased (Park and Regan, 2005; Vaziri and Ghadiri, 2012). A recent study suggested that 10% increase in transportation costs would reduce 20% of trade volume (Rodrigue et al., 2009). Transportation cost has a significant effect on final goods' prices, and trade partners are often expected to select the nearest demand and supply nodes. The effect of the transportation distance and cost on trade is a subject of debate as many geopolitical and economic factors can also play significant roles. The continents of Asia, Europe and Africa, AEA, have the advantage of land connectivity and are accommodating more than 80% of world population. Around 90% of total export of European, 79% of Asian and 76% of African countries went to other countries in Asia, Europe and Africa during 2009 (Comtrade, 2010). Higher income, urbanization growth, lifestyle change, globalization, improved transportation and evolving consumer perceptions regarding health, food quality and variability are influencing food consumption patterns. Indeed, increase in import food consumption is one of the consequences of this change (Gehlhar and Coyle, 2001; Regmi, 2001).

The study reported herein tries to shed some light on the effect of transportation on the AEA intra and intercontinental food and live animal trade. The relevant time-series data were extracted from centralized and international databases. The database consisted of variables grouped into 4 categories: food and live animal trade, transportation, geographical and socio-economic characteristics. The study deployed techniques included: preliminary and univariate statistical analysis, regression analysis, shortest path algorithm, elasticity analysis, sensitivity analysis, gravity modeling and linear programming. The international trade flows were analyzed for a 40 year period covering 1965 to 2005. The trans-continental multimodal transportation network covered 125 countries of AEA (Vaziri and Dashtestaninejad, 2010).

Database Development

The study database consisted of pertinent time-series information for international trade extracted from international and centralized databases. It comprised of country's data in 4 categories: food and live animal trade, FAT, transportation, TRS, socio-economic, SEC, and geographical, GEO. The time-series covered a 40 year period of 1965 to 2005. For each year of the study period, 9 variables were finally selected for detail analysis as shown in Table 1. The geographical scope covered 125

countries, 45 in Asia, 31 in Europe and 49 in Africa. The FAT data were extracted from the United Nations Commodity Trade Statistics Division databanks (Comtrade, 2010). The SEC and GEO were also extracted from United Nations databases (Vaziri and Ghadiri, 2012). The TRS data were developed from United Nations sources (Vaziri and Dashtestaninejad, 2010).The AEA multimodal transportation network, with distance and cost attributes, consisted of 5323 nodes, including the 125 capital nodes. Deploying network analysis algorithms, such as shortest path algorithm, TRS variables were determined for capital cities of country pairs i and j. The C_{ij}^{MM} is the optimal transportation cost for the multimodal network which included all the 4 modes of highway, H, railway, R, sea, S and air, A. The D_{ij}^{HRS} is the optimal distance with 3modes of highway, H, Rail, R, and sea, S. The D_{ij}^{Air} is the direct air distance for air mode, A.

No.	Category	Symbol	Unit	Description	Number of cases
1	FAT	T_{ij}^{EX}	$	Export of food and live animal, from country i to country j in dollar	125×125
2		T_{ij}^{IM}	$	Import of food and live animal, from country j to country i in dollar	125×125
3	TRS	C_{ij}^{MM}	$/unit of transport	Multimodal transportation cost between country i and country j	125×125
4		D_{ij}^{HRS}	Km	Multimodal distance between country i and country j	125×125
5		D_{ij}^{Air}	Km	Direct distance between country i and country j	125×125
6	GEO	A_i	Thousand km^2	Area of country i	125
7		L_i	Dummy	Landlocked of country i	125
8	SEC	P_i	Thousand persons	Population of country i	125
9		GDP_i	$/year	Gross domestic product of country i	125

Table 1: Database structure and description

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To shed some light on database structure and scope, preliminary univariate and multivariate statistical analysis was performed. As an example, the summary of preliminary univariate statistical analysis for the year 2005 is presented in Table 2. Furthermore, correlation matrices were developed showing the existence of significant correlation between variable pairs. They often showed significant correlations between trade, GDP and transportation variables. The negative correlations between transportation and trade variables suggested the negative influence of transportation cost and distance on trade.

No.	Var.	Unit	Min	Max	Mean	St. dev.	Coef. of var.	Valid cases
1	T_{ij}^{EX}	$	0	9.25×10^9	2.43×10^7	2.17×10^8	8.96	12648
2	T_{ij}^{IM}	$	0	7.91×10^9	2.41×10^7	2.09×10^8	8.58	12400
3	C_{ij}^{MM}	$/unit of transport	24	7004	2000	991.21	0.49	15500
4	D_{ij}^{HRS}	Km	60	18268	6720	3566.85	0.53	15500
5	D_{ij}^{Air}	Km	12	14748	5240	2899.47	0.55	15500
6	A_i	Thousand km^2	0.06	17075	678	1794.20	2.65	125

7	L_i	Dummy	0	1	0.74	0.44	0.60	125
8	P_i	Thousand persons	30	1.31×10^{6}	4.43×10^{3}	1.55×10^{5}	3.50	125
9	GDP_i	$/year	3.1×10^{8}	4.55×10^{12}	2.24×10^{11}	6.10×10^{11}	2.72	123

Table 2: Univariate statistical analysis for year 2005

Trade Modeling

Several trade modeling approaches can be distinguished: a microscopic level with a microeconomic point of view, a meso level with spatial interaction modeling, and a macroscopic level with a macroeconomic point of view. The spatial interaction modeling approach was found suitable for the study database. The models often used for spatial interaction modeling are based on gravity distribution and linear programming modeling (Vaziri and Ghadiri, 2012).

The gravity model was originated by Newton gravity rule of mechanical physics. The trade gravity model between two countries in its basic form assumes trade increases with country size or incomes and decreases with spatial impedance. After several preliminary gravity modeling trials, to predict FAT trade variables, 3 spatial trade impedance variables of TRS group and GDP were examined in detail by rather simple gravity form as shown by Equation 1:

$$Trade_{IJ} = d\,(GDP_I)^{a}\,(GDP_J)^{b} \,/\,(C_{IJ}^{MM} \text{ or } D_{IJ}^{HRS} \text{ or } C_{IJ}^{Air})^{c} \quad (1)$$

Where $Trade_{IJ}$ variable, trade export or import variable for countries I and J, is determined by calibrating the above model and determining coefficients a, b, c and d, for the countries I and J GDP's and the deployed impedance variable between countries I and J. Deploying multiple regression analysis, logarithmic transformation and a confidence level of 95%, for each year of the study database, trade gravity models were developed. Table 3 shows the elasticity's time trends of the gravity modeling results for 1965 to 2005 for five year intervals for the AEA 125 countries. The FAT and TRS variables are defined as in Table 1.

No.	Model of elasticity absolute value	R^2	Time trend
1	Elasticity (T_{ij}^{EX} / C_{ij}^{MM}) = - 28.551 + 0.0152 (time)	0.91	Positive
2	Elasticity (T_{ij}^{IM} / C_{ij}^{MM}) = - 7.1995 + 0.0043 (time)	0.63	Positive
3	Elasticity (T_{ij}^{EX} / D_{ij}^{HRS}) = - 15.278 + 0.0083 (time)	0.66	Positive
4	Elasticity (T_{ij}^{IM} / D_{ij}^{HRS}) = - 9.8966 + 0.0055 (time)	0.51	Positive
5	Elasticity (T_{ij}^{EX} / D_{ij}^{Air}) = - 9.1894 + 0.0052 (time)	0.45	Positive
6	Elasticity (T_{ij}^{IM} / D_{ij}^{Air}) = - 11.807 + 0.0064 (time)	0.65	Positive

Table 3: Trade elasticity trends with respect to spatial impedance variables through time

The table confirms the increasing time trend of trade elasticity with respect to TRS impedance variables, as shown by coefficient c of Equation 1. The results of linear regression modeling of Table 3 revealed that the transportation sensitivity of trade has increased over time. This could be of great interest to international organizations and national policy makers to further develop and finance regional transportation infrastructure and facilities. The study rejects the notion of the "death of distance", as some past studies were advocating. The upward trend of distance and cost effect on trade shows the aforesaid hypothesis is not always applicable at least for the food and live animal. In

contrast, AEA countries tried to reduce transportation costs over time by choosing “closer” suppliers of commodities and goods. Nevertheless, through time trade enhancement was far from linear programming, LP, optimal solutions as discussed in the following section.

To determine trade potential improvements, LP, was deployed to compare observed trade distributions with its possible optimal values. The objective function Z, reflecting AEA or continents separately total transportation “cost”, was minimized using simplex algorithm. The LP determined possible redistribution of trade considering trade supply O_I and demand D_J constraints of individual countries I and J. Due to language, historical, socio-cultural and geopolitical reasons, it is not always possible to deploy LP solution in actuality; nevertheless it’s solutions provide clues to the potentials for possible improvements. Optimization reflected by relations 2 show the deployed LP problem:

$$\text{Minimize } Z = \sum\sum (C_{IJ}^{MM} \text{ or } D_{IJ}^{HRS} \text{ or } C_{IJ}^{Air}) \, Trade_{IJ} \quad (2)$$

$$\text{Subject to: } \sum Trade_{IJ} \leq O_I, \quad \sum Trade_{IJ} \geq D_J \quad \text{and } Trade_{IJ} \geq 0 \text{ for all I’s and J’s}$$

To determine the trends of improvement potentials through time, regression models for AEA and continents separately were developed. Table 4 shows the trends of possible improvement potentials, resulted by LP solutions, for food and live animal trades, for multimodal networks. Equation 3 shows the relation for percent possible potential improvement, PIZ:

$$PIZ = 100 \left(\left(Z_{observed} - Z_{optimum} \right) / Z_{observed} \right) \quad (3)$$

Where $Z_{observed}$ is determined from the study database and $Z_{optimum}$ is the LP solution of Equation 2. The intra-continental improvement potentials were often more for Europe and Asia than Africa as can be seen from Table 4. Nevertheless, significant trade improvement potentials were observed for all the 125 countries of AEA.

No.	Model of elasticity absolute value	R^2	Time trend
1	PIZ $(T_{ij}^{EX}, C_{ij}^{MM})_{AEA}$ = - 0.1399 (time) + 319.48	0.56	Negative
2	PIZ $(T_{ij}^{IM}, C_{ij}^{MM})_{AEA}$ = + 0.1431 (time) - 242.52	0.73	Positive
3	PIZ $(T_{ij}^{EX}, D_{ij}^{HRS})_{AEA}$ = - 0.1972 (time) + 449.38	0.69	Negative
4	PIZ $(T_{ij}^{IM}, D_{ij}^{HRS})_{ASIA}$ = + 0.1271 (time) - 216.91	0.31	Positive
5	PIZ $(T_{ij}^{IM}, C_{ij}^{MM})_{ASIA}$ = + 0.2111 (time) - 393.11	0.55	Positive
6	PIZ $(T_{ij}^{EX}, C_{ij}^{MM})_{ASIA}$ = + 0.2861(time) - 538.82	0.62	Positive
7	PIZ $(T_{ij}^{EX}, D_{ij}^{HRS})_{ASIA}$ = + 0.3481(time) - 659.53	0.74	Positive
8	PIZ $(T_{ij}^{EX}, C_{ij}^{MM})_{EUR}$ = + 0.0579(time) - 84.91	0.45	Positive
9	PIZ $(T_{ij}^{EX}, D_{ij}^{HRS})_{EUR}$ = + 0.1011(time) - 169.22	0.37	Positive
10	PIZ $(T_{ij}^{IM}, D_{ij}^{HRS})_{EUR}$ = + 0.011 (time)^2 - 46.55 (time) + 46198	0.75	Flat
11	PIZ $(T_{ij}^{IM}, C_{ij}^{MM})_{EUR}$ = + 0.006 (time)^2 - 24.82 (time) + 24665	0.75	Flat
12	PIZ $(T_{ij}^{EX}, C_{ij}^{MM})_{AFR}$ = - 0.513 (time) + 1031	0.62	Negative
13	PIZ $(T_{ij}^{EX}, D_{ij}^{HRS})_{AFR}$ = - 0.702 (time) +1424	0.61	Negative

14	PIZ (T_{ij}^{IM} , D_{ij}^{HRS})$_{AFR}$ = - 0.380 (time) + 786.1	0.21	Negative
15	PIZ (T_{ij}^{IM} , C_{ij}^{MM})$_{AFR}$ = - 0.177 (time) + 368.1	0.20	Negative

Table 4: Percent possible improvements in trade redistribution

As the table shows, the intra-continental trade improvement potentials for Asia and Europe significantly grew over time compared with Africa, a possible missed opportunity for them as compared with Africa. In other words, Africa showed a convergence of time trend with LP optimal distributions through period of 1965 to 2005. In the contrary, Europe and Asia trades showed divergences of time trend from LP optimal distributions.

Conclusion

The study shed some light on food and live animal trade trend for three continents of Asia, Europe and Africa, AEA. The trade and transportation among 125 countries, based on spatial interaction models during the period of 1965 to 2005, were assessed and evaluated. The study AEA transportation multimodal network consisted of 5323 nodes connected by highway, railway, air and sea links. The study database consisted of national time-series information for 9 pertinent variables: food and live animal import and export trades between country pairs, multimodal optimal transportation cost between country pairs, multimodal optimal distance between country pairs, air distance between country pairs, GDP, population, area and landlocked. The study deployed techniques included: preliminary statistical analysis, regression analysis, shortest path algorithm, elasticity analysis, sensitivity analysis, gravity modeling and linear programming.

The database preliminary statistical analysis showed significant correlations between trade, GDP, and transportation variables when compared with other variables. Indeed, the developed cross-sectional gravity models confirmed that food and live animal trade between country pairs are related to their GDP's and transportation costs or distances. Elasticity analysis based on the developed gravity models highlighted that the transportation variables seems to play an important role on AEA region trade and this effect is increasing in parallel with globalization trends over time for the whole AEA region, and its 3 continents. This effect is expected to be even more significant in the near future with the current growing trends of energy price and economic crises. Trade elasticity with respect to cost and distance had highest values for Asia and Europe respectively. Africa had lowest transportation sensitivity of trade among studied areas even when trade sensitivity grew significantly over time. The optimal trades, based on linear programming solutions, were compared with observed distributions. Comparison revealed that up to 60% of the AEA total transportation costs can be reduced if the observed trades follow the LP optimal distributions. The differences mostly attributed to the historical, socio-cultural, language, geopolitical, global and other influencing factors that were not considered in this later optimization exercise. Percentage of possible improvement decreased during the study period for Africa. In contrast, percentage of possible improvement for Europe and Asia trade often increased, indicating that observed distributions diverged from the optimums. This study was a preliminary step toward the AEA time-series transportation and trade appraisal. Deploying the study methodology and results can enhance pertinent policy making and infrastructure development at the AEA national and regional levels. The study database and results were limited to extractable information from centralized and accessible international databanks, nevertheless, the same methodology can de used for other geographical and spatial/temporal information to enhance trade and commerce.

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Biographies

Manouchehr Vaziri is a Ph.D., P.E. and professor of transportation engineering with more than 30 years of teaching and research in different areas of transportation. **Bahador Ghadiri** is a M.S. transportation and logistics engineer at the municipality of the historic city of Esfahan.

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A REFERENCE MODEL OF THE DISTRIBUTION CENTER IN HOSPITAL SUPPLY CHAIN

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Introduction

Supply chain and logistics management has been continuously developed to improve business performance in organizations over the last three decades. It is undeniably the one of the most critical mechanisms for any industry since the efficient management of supply chain and logistics is the key to success of any suppliers, manufacturers and retailers, for example. Hospital industry, in particular, has been growing with the ever increasing demands for healthcare services. Hospitals serve customers and patients whose demands are varied dramatically; therefore, the supply chain and logistics has been at the heart of hospital management. However, hospital"s supply chain and logistics development is still at the early age as opposed to that of other industries. A typical hospital supply chain is a complex network consisting of the linkage role between vendors, manufacturers, distributors, hospital and internal departments. The co-ordination of material flow and information flow within the chains are subject to individual hospital"s strategy and policy. The efficient supply chain management contributes greatly to competitive advantage of any business; hence, the inefficient one may cause the opposite. As a result, hospitals have to align their objective and strategy to maximize patient care while minimizing variable costs and wastes (Everagd, 2001: DeScioli, 2005).

In Thailand, most hospitals are owned and managed by government with; the traditional hospital management. The lack of standardized processes of such management cause poor operations and co-ordinations between relevant units in supply chain and may lead to unsatisfied service provided to customers. It is apparent that amidst the increased demands for healthcare services, the number of state health personnel and facilities system could not support them (Ministry of Public Health, 2008-2010). Kritchanchai (2012) highlighted that the top concerns and problems raised by focused parties in healthcare industry in Thailand are inefficient business process, data inconsistency and fragmented supply chain system. This has prompted the need for a proposed framework for Thailand healthcare supply chain which is based on the confirmed problems and intervention improvement; standardization, information sharing and business process re-engineering. The problems of management and operational system at Ramathibodi hospital, a large sized public teaching hospital with approximately 1,000 with continuous increased in number of patients, caused high inventory level, high average storage time, and poor storage conditions in each distribution center due to limited space and facilities support system (Healthcare Supply Chain Excellence Centre (LogHealth), 2012).

Several supply chain management and development studies suggested that distribution center is one of the most significant parts in supply chain because it represents a large amount of costs of material storage and control (e.g. temperature-controlled, distribution process etc.). The uncontrolled storage conditions in distribution center impact materials" quality which inadvertently linked to the chance of patient"s survival and recovery. In effect, supply chain and logistics management is crucial for inventory distribution and control in distribution center to achieve optimal accuracy, timeliness, traceability to attain hospital"s performance (Hutujuta and Punnakittikasem, 2001; Toba et al., 2008).

To maximize the long term hospitals" competitiveness in patient"s safety, business process re-engineering, standardization and information sharing through efficient and effective supply chain and logistics management, the development and implementation of reference model of the distribution center in hospital supply chain is required (Brown et al., 2011). The full-scale model in distribution processes derived from the reference model will connect the role and responsibility of data interfaces and activities in hospital supply chain. The well-designed structure and standardized processes will improve performance, response times and quality of care for decision making as a result. Therefore, the present study focuses on a full-scaled reference process model of the distribution center in hospital supply chain.

The present study is organized as follows: (i) literature review, (ii) purpose of the study, (iii) case observation and analysis, (iv) reference process model design and (v) discussion.

Literature Review.

Reference models (RMs)

Reference Models (RMs) are generic conceptual models and framework which represent the business"s best practice universally applied in company specific processes or projects. The benefits of implementing Reference Models to business includes cost and time reduction, quality improvement, risk reduction, process transparency, common language and basis for benchmarking (Kirchmer, 2011; Miers, 2008). The development of process design and continuous sustainably improvement for the company or cross-industry could reuse the RMs in combination or individually, to reduce the development cost and time to company"s specific process models (Kalpic and Bernus, 2002; Pajk et al, 2012). Verdouw et al. (2010) brought about an example of Reference Model usage designed for fruit industry in Europe. They analysed fruit-specific knowledge and generic knowledge in cross-industry standards and proposed the business process that could provide fruit companies with personalized configuration in supply chain design and information system implementation.

Similar to hospital supply chain, the reference process model designed using generic process could be applied to hospitals at all scales. The benefits will not be limited to the hospitals themselves but extended to the related players in hospital supply chain and, ultimately, to the patients. The reference processes in the model explain the roadmap for each role and responsibility with step-by-step activities. Besides the operational steps, the reference processes provide control points and key performance of each activity. The outline activities and performance metrics support the management team in decision making and can be adapted to company"s needs. In sum, the reference process model engineers the management plan at strategic, tactical and operational levels.

SCOR model

The Supply Chain Operations Reference model (SCOR), designed by the Supply Chain Council (2012), is the most widely used business process reference models in various industries. It is one of Supply Chain management tools used to address the overall processes and activities from supplier"s supplier to a customer"s customers. The SCOR model has five basic processes: Plan (P), Source (S), Make (M), Deliver (D) and Return (R), and provides a standard process model which describes the organization best practice framework of management processes. The model contains a linkage between business objectives to supply chain operations, with standard metrics to measure process performance or KPI at each level of hierarchy. SCOR Model has four levels of hierarchy: top, configuration, process element and implementation. The top level (Level 1) is the design of process types (Plan, Source, Make, Deliver, Return). The second level (Level 2) involves configuration of the supply chain that is the detailed descriptions of the process types" sub categories, such as „Make to stock", „Make to order", and „Engineer to order" or „Production execution" The third level (Level 3) is the decomposition of processes to the process element level, in line with its strategies and performance metrics. The fourth level (Level 4) is the implementation of the supply chain and best practice solution. This level is not included in SCOR framework but can be applied as a sub-process in specific business conditions.

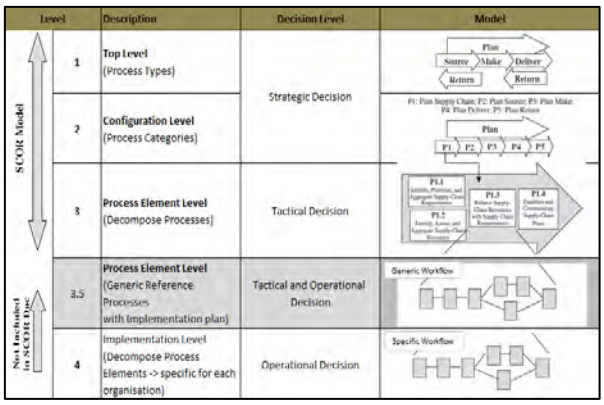

Figure 1: Levels of SCOR model

Since the SCOR level four requires specific details from each hospital environment for the implementation stage, the proposed reference process model was upgraded to SCOR level 3.5 adopting generic processes. The SCOR level 3.5 takes into account the tactical and operational levels that support management team in making decision as shown in Figure 1.

SCOR performance attributes and metrics
The SCOR Model describes supply chain activities for business at each level, and defines a set of performance metrics used to evaluate the processes. There are five dimensions to performance measurement: Supply Chain Reliability, Supply Chain Responsiveness, Supply Chain Agility (Customer-Focused attributes), and Supply Chain Costs, Supply Chain Asset Management Efficiency (Internal-Focused attributes). The SCOR Metrics is a standard measurement guidance for Supply Chain Performance linking metrics to support decision-making process. A good performance measurement system provides key measurement method which incorporates process alignment that aims to achieve strategic goals of organization. (SCOR, 2011)

The SCOR metrics are organized in a hierarchical structure as well as SCOR Model process framework, it describes in level-1, level-2 and level-3 metrics. The relationships between these levels are diagnostic. At Level 1 Metrics has ten strategic metrics primary as a high level process. The top level metrics are the key performance indicators (KPI) for company strategic measurement and can use as a framework for multiple SCOR processes in supply chain. Level-2 metrics indicate the root-cause of performance gap for level-1 metrics, and level-3 metrics are linked to the operational processes. The efficient and effective process design should consider the correlation of process and performance metrics at sub-levels, referring from the SCOR-based alignment framework and Best Practices.

Performance measurement system
Supply Chain Performance measurement system can be developed based on SCOR metrics and Best Practices. The correlations between metrics and processes of the system enable management to comprehend the relationships across the system and accomplish organization"s goal and overall performance. Ineffective and inefficient performance measurement system affect the entire supply chain management system as managers could not monitor and gather all necessary information for decision-making. In addition, the performance measurement system could make process improvement possible as Harington (1991) said that “If you cannot measure it, you cannot control it. If you cannot manage it, you cannot improve it.”

Performance measurement and metrics have a significant role in Supply Chain Management in determination of company"s objectives and future courses of action plans, and in evaluation of performance (Gunasekaran et al., 2004). Kocaoglu et al. (2011) studied a supply chain performance metrics in a hierarchical way, using AHP and TOPSIS methods to weight metrics importance. They found that performance metrics priorities support to the organization"s strategic direction. There are various methods used in supply chain performance systems designed to measure operational performance, evaluate effectiveness and efficiency and continuously improving overall supply chain performance to achieve company"s competitive advantages. How and what elements to measure are the key questions required clarification while developing performance measurement system depends on which aspects of the key objectives. (Cai et al., 2009)

Healthcare Performance Measurement, in particular, involves performance of several stakeholders and functions such as, suppliers, delivery, customer-service, and inventory management in a supply chain. The target outcomes of healthcare supply chain are, for example, the recovery of patient"s health, responsiveness to support during care, quality of services, and productivity of the resources within the healthcare systems. Performance of each stakeholders and functions are complicated to measure and, as a result, are unable to be evaluated by any single performance method (Smith et al., 2010).

Business process modeling notation (BPMN)
BPMN Version 2.0 was introduced by the OMG (Object Management Group) (2011) as one of the standardized tool visualizing diagrams used to model and interpret the business process diagram. The purpose is to facilitate communication of an end-to-end process to all cross-functional organization units by means of information structure in both professional management and technical IT terms. In this regard, BPMN standardizes blocked-structured process execution languages, between the business process design and process implementation (Cornu et al., 2013). BPMN provides a symbolic diagram notation of each role in a company, divided by lane and pool for individual activity in a process. There are three core elements that used to form the structure and describe the process diagram, such as, Event, Activity and Gateway (Minoli, 2008).

BPMN is popular in both business and IT communities because its symbolic visuals can provide a simple way to communicate process information to other business users, process implementers, customers and suppliers. Based on a global survey of BPMN process modelers conducted by Recker (2008), approximately 51 percent of the respondents use BPMN for business purposes (process documentation, improvement, business analysis, stakeholder communication); whereas, 49 percent of the respondents use the notation for technical purposes (process simulation, service analysis and workflow engineering). From the survey, Microsoft Visio was the tool used by 18.2 percent of the respondents; therefore, it was applied as the tool for the present study as described in the later section.

Purpose of the study

The present research studied the existing business process model of distribution center of three large-size-hospitals in Thailand to identify the best practice and development of generic reference process models in the hospitals‟ supply chains. The purposes of the study is to develop a generic business process models with a set of performance parameters for distribution center that support decision makings and act as a reference model for use in top-down structured organizations. The research question of this study is how can reference process models be designed for the distribution center for large-size-hospital supply chain in Thailand? The qualitative research approach applied in the study includes in-depth interviews, additional desk research and observation of the existing distribution process at two public and one private large-scale hospital. The data was collected and analysed to obtain the As-Is pharmaceutical distribution process as a basis for the development of the standardized generic model

Case study and results

Case observation and analysis

As mentioned in Section 2, we will based our research on the current generic supply chain processes within the distribution centres of three-large-size hospitals as case studies environment, and modelled based on the information from the in-depth structure interview conducted with the hospital head officers in related work area and site observation. Similar patterns and processes are observed in the distribution centres of these three hospitals, with different technology and system or management policy. However, the generic processes are similar and can be potentially applied and extended to the reference model of same direction of control parameters.

As-Is distribution processes

The case study environments for public hospitals consist of a large-size hospital, which one of those is the oldest and largest hospital in Thailand. Hospital A is one of the largest medical schools in South East Asia. It has a capacity of more than 2,000 beds and more than one million outpatient visits per year. Hospital B has about 1,000 beds capacity with more than 5,000 outpatients served per day. It won the best Thailand‟s Most Admired Company in 2013 by the Company Magazine, with average score 7.04 in overall for the image of brands owned and lead in innovation in Hospital business in Thailand. Another location for our case study is the first and the largest private-hospitals in Thailand. Hospital C has grown its branches network to 13 locations around the country and the broader Asian region, offering the most advance and specialized medical treatment technology, under logistics centre and lab specialties distribution for all the branches.

The As-Is Distribution processes of these three hospitals, can be divided into two main parts, which are the internal distribution (outbound) processes and the external distribution (inbound) process. The internal distribution (outbound) or stock-out occurs on schedule weekly plan, starting from having the dispensing points to update their stock on hand and plan to reserve the drug request to distribution centre. From the As-Is internal distribution processes of Hospital B, it can be seen that the „stock on hand‟ updates and drug requests are done via ERP system, then the list is passed throughout the distribution centre for further processes. Once orders are picked up, goods is packed and ready to deliver per schedule, dispensing points will check orders when received and Put-away to Storage location. For the external distribution (inbound) or stock-in process, it will begin with the Purchasing department running through the stock on hand and placing orders to suppliers, then within agreed lead-time the Distribution Centre will receive the goods and proceeds on with the distribution centre processes. To verify the medical products specially, suppliers are required to attach the Quality certificate document, or Temperature check equipment (for cold-storage), other than checking goods physical appearance only. If the quality of the Order delivered is not satisfactory, the Distribution centre will return goods for the whole batch as per contracts agreement.

Reference Process Model Design

Product movement types are to identify the products" demand characteristics especially for hospitals that implements stockless supply chain policies. The demands have to be analyzed and modelled on a daily or monthly basis and it can be defined from the frequency of usage and Sales forecast. It can be classified into three levels as Slow-moving, Moderate-moving and Fast-moving, which affects the re-ordering point in order to manage inventory cost to balance with demand. From the generic processes in the distribution centre of general Hospital, the pattern of product movement shows that most of medicines are usually kept stock for daily demand usage and some that are for vital usage are required to be stored in hospital even with no demand. Therefore the „Reference Process Model" will be designed based on Make-to-Stock model structure using five major processes within distribution centre (see Figure 2), which enable suppliers to deliver the products within a short lead-time when Purchasing place the Orders.

Figure 2: Generic distribution center processes

SCOR Level 1 and level 2

When we adopt the SCOR Model to describe the pharmaceutical products flow and information flow within and throughout the Distribution centre, the activities that are used to determine on process types for SCOR Level 1 is as shown in Figure 3 (left). For process categories, as mentioned earlier that we focused on distribution centre processes (some parts on „Purchasing" will also be considered), the SCOR Level 2 in Figure 3 (right) is modelled based on Make-to-Stock products, which we rename the process categories to align with distribution processes and hospital supply chain per following:-

Plan (PL): the process to determine requirements and corrective action to achieve supply chain objective for inbound and outbound logistics

Receive (RE): the process of ordering and receiving products, including replenishment inventory and return for defective product

Put-away (PU): the process of transferring verified products to storage location

Order-picking (OR): the process of receiving the orders and pick up products to be ready for shipping

Shipping (SH): the process of order management and order fulfillment activities to serve customer satisfaction

Return (RT): the process of moving defective products back through the supply chain or supplier

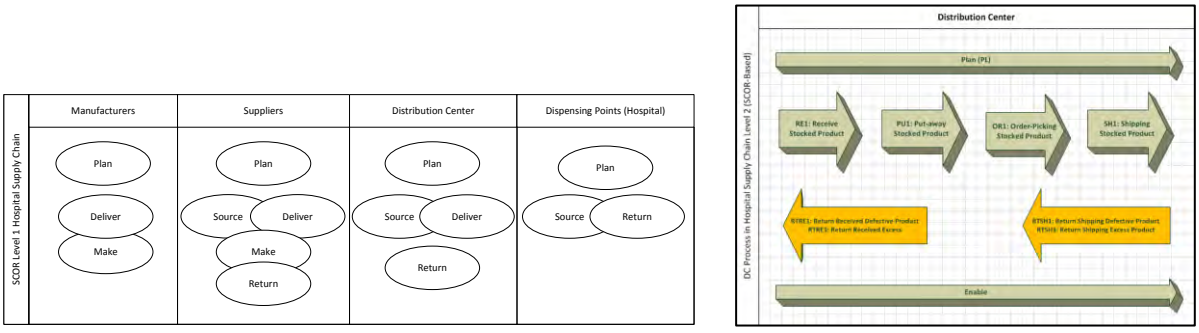

Figure 3: Distribution process in healthcare supply chain (SCOR level 1 and 2)

SCOR level 3 to level 3.5

In previous section, SCOR level 1and Level 2 described how the processes are defined in the high level of distribution centre in hospital supply chain. SCOR Level 3 will break down processes into a tactical decision level while additional model Level 3.5 will consider the operational decision level of the distribution centre using the generic Inbound and Outbound logistics throughout the processes

(see in Figure 4). As mentioned in section 2.2, we have put in extra effort to upgrade SCOR model Level 3 to Level 3.5, in order to show users the roadmap on how the reference model can be implemented in such environments.

Figure 4 Reference Model for Distribution Centre Process in Hospital Supply Chain (SCOR-Based Level 3.5) shows us the interface between Purchasing – Distribution Centre (Inbound) – Distribution Centre (Outbound) – Dispensing Points. It is written in BPMN platforms to represent the start and end processes of information flow and product flow for the whole processes. This is important for the IT part; to design on how each of the information will be link together, and using that to select the proper IT supports to achieve the most efficiency performance. The Reference Model can also be used to support the Capability Requirement, Network Design, Facilities Considerations, and scope down to Operational Planning as mentioned (Rouwenhorst et al., 1999; Coyle, 2003).

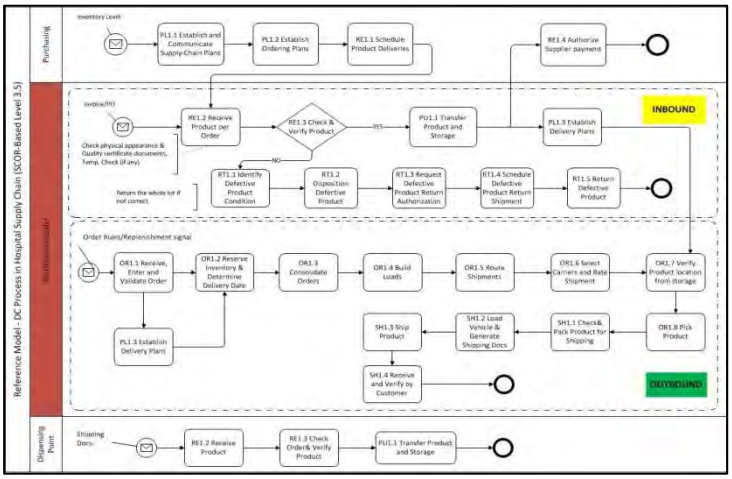

Figure 4: Reference model of distribution process in hospital supply chain (SCOR-Based Level 3.5)

Determined the case studies scenarios into reference model based on SCOR Best-practice, we classified the Process Categories according to processes within Distribution Centre as; Plan (PL), Receive (RE), Put-away (PU), Order-Picking (OR), Shipping (SH) and Return (RT). With this classification, the management of hospital can see the operation scale and manage in which position is required for each activity, and design for the organization workforce at each process for the required role to be fulfilled. At the beginning, each role will be triggered by receiving information to start the process. For example, Purchasing will start Process PL1.1 from Inventory level, then establish and communicate supply chain plan, PL1.2 (Ordering plans) submit to suppliers with RE1.1 (Product Schedule) to deliver to Distribution Centre (Inbound). The workflow process will continue to the next role and activities respectively, as well as, product and information movement where necessary along the roles and responsibilities. However, some processes are the same activities and are defined as same Process ID, such as, RE 1.2, RE 1.3 and PU 1.1 process. These are separated and specified more particularly by roles and responsibilities. Also the performance metrics using at each process, each roles are different by the measuring methods, which will be described in the next section.

Performance measurement system design

As mentioned in Section 1 in the overview of problem background that hospital supply chain still require a proper improvement and control of inventory with quality of goods storage and distribution practices conditions, those system affect directly to the patient safety and hospital"s performance and service level. In this section you will see the performance outcome of Metric ID at each activity based on SCOR Level 3 that impacts the top-down process and decision in terms of time, cost and efficiency. We have mapped the processes and Performance Metric IDs for each Role and Responsibility within the distribution centre process of hospital supply chain, in order to show the implementation roadmap on how the interaction of the process and how the key performance can be measured.

In our research, the designed Reference Model of Distribution centre in Hospital Supply Chain is considered at Process / Metrics Alignment level based on SCOR Best Practices. The Performance-Process mapping diagrams show that outbound distribution, starting from order receipt to deliver to

customers, is the key function in Distribution centre and it has the most impact on overall Performance. Reliability and Responsiveness are the major Performance attributes of the outbound distribution with covering process activities about 40.74 and 44.45 percent respectively; as they are addressed to customer-facing attributes, whereas Agility, Cost and Asset Management Efficiency have a small impact for about 15 percent from total 27 processes in Distribution centre.

Hence the Metric is a standard for measurement of the process performance in supply chain, and SCOR Metrics are demonstrated in three-level of pre-defines metrics. From Table 1, Performance Attribute – Reliability at Level-1 Metric is RL.1.1 (Perfect Order Fulfillment) as its strategic metric and key performance indicators (KPI). It has four main „Level-2" metrics and various „Level-3" metrics identified with the processes. It shows that Process SH1.2 (Load Vehicle & Generate Shipping Docs) at Distribution Centre (Outbound) directly affects the performance „Level-2" Metric RL2.3 (Documentation Accuracy), and those are part of the KPI at Level-1 metric RL1.1 (Perfect Order Fulfilment).

Attribute	Level-1 Metric	Level-2 Metric	Level-3 Metric	Process	Role & Responsibility
Reliability [Total Perfect Orders] / [Total Number of Orders] x 100%	**RL.1.1** **Perfect Order Fulfillment**	**RL.2.1** **% of Orders Delivered in Full**	RL.3.33 Delivery Item Accuracy	OR1.1 Receive, Enter and Validate Order	Distribution Center (Outbound)
			RL.3.35 Delivery Quantity Accuracy		
		RL.2.2 **Delivery Performance to Customer Commit Date**	RL.3.32 Customer Commit Date Achievement Time Customer Receiving	SH1.4 Receive and Verify by Customer	Distribution Center (Outbound)
			RL.3.34 Delivery Location Accuracy	OR1.1 Receive, Enter and Validate Order	Distribution Center (Outbound)
		RL.2.3 **Documentation Accuracy**	RL.3.31 Compliance Documentation Accuracy	SH1.2 Load Vehicle & Generate Shipping Docs	Distribution Center (Outbound)
			RL.3.43 Other Required Documentation Accuracy		
			RL.3.45 Payment Documentation Accuracy		
			RL.3.50 Shipping Documentation Accuracy		
		RL.2.4 **Perfect Condition**	RL.3.12 % Of Faultless Installations	N/A	N/A
			RL.3.24 % Orders/lines received damage free	RE1.3 Check Order& Verify Product	Distribution Center (Inbound)/ Dispensing Point
			RL.3.41 Orders Delivered Damage Free Conformance	SH1.4 Receive and Verify by Customer	Distribution Center (Outbound)
			RL.3.42 Orders Delivered Defect Free Conformance		

Table 1: Level-1 through 3 of performance attribute – reliability and processes linked

The standard process-metrics alignments need to be analyzed to reflect performance aspects at each process. Reliability, Responsiveness, Agility, Cost, and Asset Management Efficiency attributes are demonstrated in three-level of pre-defines metrics. The consequence of the standard performance metric IDs are mapped to SCOR model-level 3, which will serve the performance attributes at the level-2 and level-1 to support the decision making. Therefore the analysis of performance metrics ID from Level-1 through level-3 can help manager to find the root cause of overall performance and lead to maximize the long term hospitals" efficiency and cost.

Discussion

In conclusion, this research has reached its objective and the research question. The main purpose of the present study is to develop a standardized business process models with a set of performance parameters for distribution center toward improving the hospital supply chain. The proposed reference process model was designed based on the generic distribution processes at three-large-size hospitals in Thailand. BPMN Notation and SCOR framework were applied to main activities in distribution center; Plan, Receive, Put-away, Order-Picking, Shipping and Return, where specific roles and responsibilities are defined at each process. The efficiency of business process, data consistency and supply chain management system for the end to end process between parties, have been considered for the performance measurement system design. With these results, it can be used to assist the manager on setting standard guidelines for implementation and/or process improvement within Distribution centre and toward Hospital supply chain. A well-structured reference model demonstrates key performance indicators at each process and roles can help management to analyze the problem root cause for further development.

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FOOD PRODUCTS TRADE TRENDS FOR AEA REGION

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Abstract
This research aims to determine the trade trends of various food products in Asia, Europe and Africa, AEA, in which, the trade is examined in both the value of the trade in US dollar and the weight of the trade in kilogram. The trade data of the various food products for the value and the weight of the trade consisting export and import information, was acquired from UN Comtrade Database for 125 countries in Asia, Europe and Africa, for 9 years covering the period of 1965 to 2005. According to the Standard International Trade Classification, SITC, the various food products called Food and Live Animals, are divided into 10 subdivisions as the first level of subdividing this commodity. After the trade data was gathered, linear regressions were drawn for food products within the period cited whereby, the trade trends of the different food products in Asia, Europe and Africa were achieved. The linear regression models obtained for the value of the trade were ascending for whole 10 subdivisions from 1965 to 2005, whereas for the weight of the trade, only the trends of 7 subdivisions were ascending and the trends of 3 other subdivisions encompassing Live Animals, Fish and Feeding Stuff for Animals which are related to animals were descending. Furthermore, regarding the trends obtained for the weight of the trade, the most descending slope belongs to Feeding Stuff for Animals and the most ascending slope belongs to Cereals. By analyzing the gathered data and computing the regression models for the value and the weight of the trade, the impact of the value on the weight of the trade is determined, in a way that it is perceived whether for each food product, the trend of the value of the trade and the trend of the weight of the trade over the period mentioned, are ascending or descending or in opposite direction with respect to each other.

Keywords: Food products, Value of trade, Weight of trade, Regression, Trend.

Introduction

Higher income, urbanization, other demographic shifts, improved transportation, and consumer perceptions regarding quality and safety are changing global food consumption patterns (Regmi, 2001). Increase in trade is considered as one the consequences of shifts in food consumption (Regmi, 2001). One of the primary factors affecting food consumption patterns is the ability to purchase food somehow that the last two decades, have exhibited major increases in per capita income levels of households all over the world (Regmi, 2001). While increases in income have enhanced food purchasing power, better trade and transportation have improved its selection and availability (Regmi, 2001). Besides income and improved transportation, lifestyle changes related to urbanization also determine the composition of the food consumed (Regmi, 2001). Generally, there are some determinants specifying the structural changes in world food trade which encompass factors including growth on the supply side, income growth on the demand side, and barriers to trade (Gehlhar and Coyle, 2001). On the supply side, changes in the relative abundance of primary factors such as labor and arable land, determine changes in production costs (Gehlhar and Coyle, 2001). Meanwhile, a higher rate of educational attainment generally results in an expansion in the supply of skilled labor. Skill requirements can vary with technologies employed in the production process (Gehlhar and Coyle, 2001). Demand-side effects come about as household income rises in a way that an increase in income brings about an increase in food expenditures (Gehlhar and Coyle, 2001). Other factors affecting trade structure in addition to supply and demand-side factors are barriers to trade, existing in the form of policies and transportation costs (Gehlhar and Coyle, 2001). Transport costs can act as a formidable barrier to trade just as tariffs, and like tariffs these costs vary by commodity (Gehlhar and Coyle, 2001).

In this research, trade trends of food products based on the value of the trade in US dollar and the weight of the trade in kilogram have been examined in a way that across Asia, Europe and Africa, AEA region, 125 countries were considered and the value and the weight of the trade amongst these countries since 1965 to 2005 were evaluated. According to the Standard International Trade Classification, SITC, provided at United Nations Statistics Division, food products have been divided

into 10 subdivisions. Each subdivision has been determined as a distinct commodity exhibited by use of a code. Besides, the data of the trade for food products as a whole which is known as Food and Live Animals in SITC, was applied in research. The study exhibits how the trends of the trade for value and weight change and how the changes in the value of the trade can affect the weight of the trade during the aforementioned period.

Trade Classification

In order to comprehend the structure of trade in different countries and be familiarized with the variations of trade within different time sections, the statistics of international trade should be classified in a vivid and unique way (Ghadiri Faraz, 2011). There are several classification systems including Harmonized System, HS, the Standard International Trade Classification, SITC, and the Standard Transportation Commodity Classification, STCC (Ghadiri Faraz, 2011). In this research, SITC system has been utilized. In this classification system, the Code 0 has been ascribed to Food and Live Animals and 10 Codes have been attributed to its subdivisions. Based on United Nations Statistics Division, these codes are defined as below:

i. Food and Live Animals _ (Code 0).
ii. Live animals other than animals of code 03 _ (Code 00).
iii. Meat and meat preparations _ (Code 01).
iv. Dairy products and birds' eggs _ (Code 02).
v. Fish (not marine mammals), crustaceans, mollusks and aquatic invertebrates, and preparations thereof _ (Code 03).
vi. Cereals and cereal preparations _ (Code 04).
vii. Vegetables and fruit _ (Code 05).
viii. Sugars, sugar preparations and honey _ (Code 06).
ix. Coffee, tea, cocoa, spices, and manufactures thereof _ (Code 07).
x. Feeding stuff for animals (not including unmilled cereals) _ (Code 08).
xi. Miscellaneous edible products and preparations _ (Code 09).

Data Base

In order to gather the data of the value and the weight of the trade for processing this research, 125 countries in Asia, Europe and Africa were chosen. By Java programming language, a computer software analogous to a Web Crawler was programmed whereby, the data of the value of the trade among 125 countries encompassing, data of export and import since 1965 to 2005 for food products and its various subdivisions was collected from the United Nations Commodity Trade Statistics Database, UN Comtrade. Besides, in order to collect the data of the weight, some countries among 125 remarked countries were selected. After gathering the data of the weight for these selected countries, the coefficients of converting the value of the trade to the weight of the trade were computed whereby, the weight of the trade for 125 countries was acquired.

Each subdivision is represented by a code from code 00 through code 09. In fact, each code symbolizes one of the subdivisions of Code 0. Furthermore, the time period cited previously, was divided into five-year sections from 1965 to 2005. Subsequently, the data of the trade has been obtained for 9 time sections.

Inasmuch as there are 125 countries, 10 subdivisions of food products, 9 time sections and the trade data of import and export, accordingly, for either the value of the trade of subdivisions or the weight of the trade of subdivisions, 2812500 data points were gathered.

Regression Models

By using MATLAB, a program was defined in order to sum the import and export data of trade among 125 countries for each code in each year. In this procedure, the number of the countries whose data was available was counted by the defined program as well. Afterwards, for each code in each year, the sum of the value of trade for import and export for 125 countries was divided by the number of the countries whose trade data was available. The consequence of this process is a number symbolizing the average value of the trade in US dollar for each code in each year between each pair of countries among 125 countries whose data is available. Subsequently, this procedure is repeated for each code in each year. Thus, the chart of the average value of the trade versus time for each code was drawn as shown in Figure 1. In this figure, each point implicating the average value of the trade is linked to

another one in order to form the curve of each code. Besides, the linear regression model of each code was computed and tabulated in Table 1.

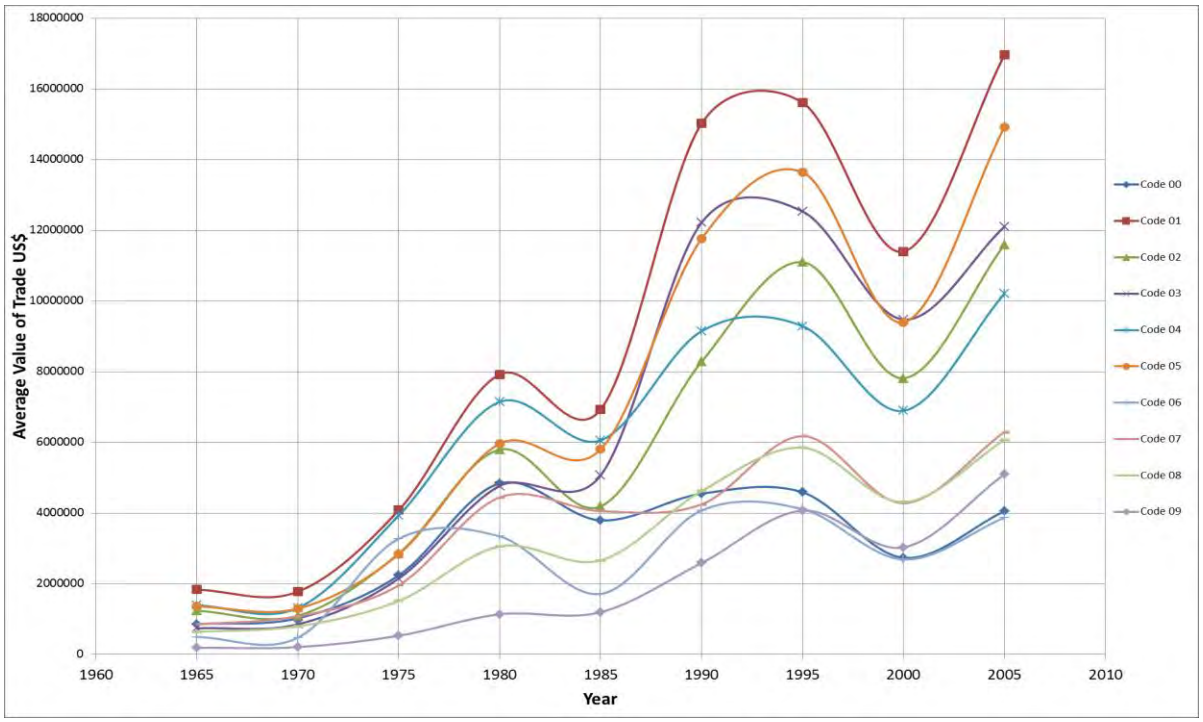

Figure 1: The average value of trade during 1965-2005, 10 subdivisions of Food and Live Animals

Moreover, the procedures mentioned above, are implemented for the weight of the trade. The consequence of this process is a number symbolizing the average weight of the trade in kilogram for each code in each year between each pair of countries among 125 countries whose data is available. Subsequently, this procedure is repeated for each code in each year. Therefore, the chart of the average weight of the trade versus time for each code was drawn as indicated in Figure 2. In this figure, each point implicating the average weight of the trade is linked to another one in order to form the curve of each code. The linear regression model of each code was tabulated in Table 1 as well.

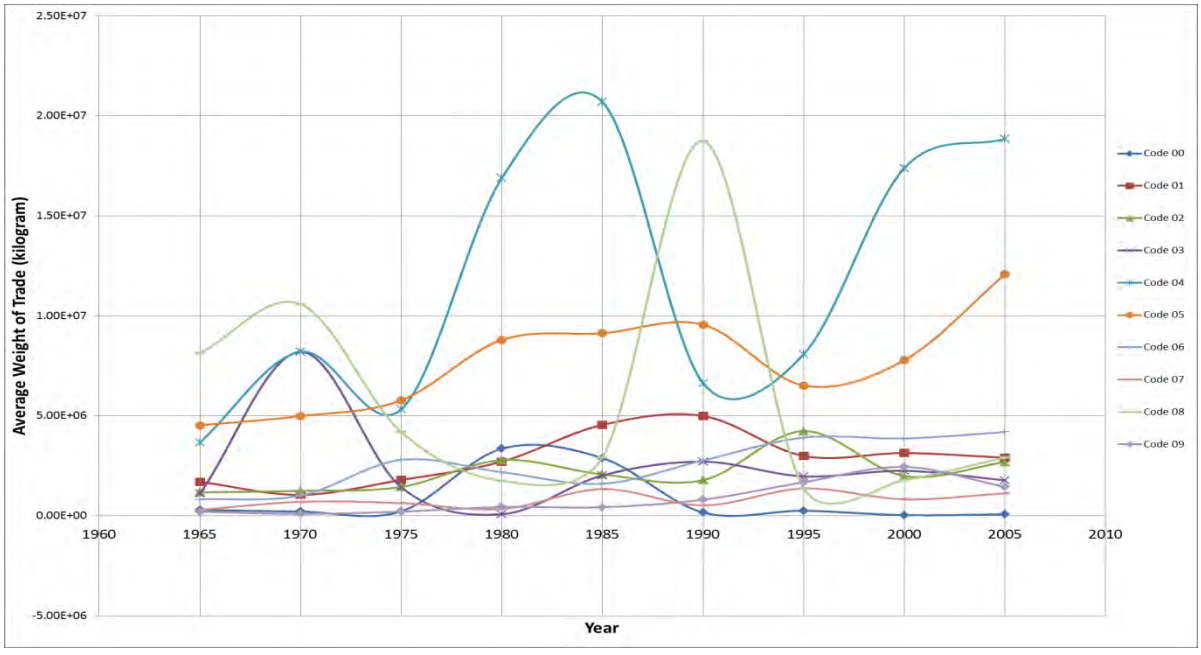

Figure 2: The average weight of trade during 1965-2005, 10 subdivisions of Food and Live Animals

The linear regression models gained for the subdivisions of food products trade and the aggregate food products trade which have been shown in Table 1, determine the trade trends since 1965 to 2005. In these equations, the letter t symbolizes time and the letters V and W represent the value of the trade and the weight of the trade respectively. Besides, the coefficients of determination, R^2, implicating how reliable the offered models can be, have been exhibited beside each model.

In order to compare the trade of the subdivisions to that of aggregate Food and Live Animals, namely Code 0, the processes accomplished above will be carried out for the value and the weight of the trade of Food and Live animals by which, the charts of the trade of Food and Live Animals versus time are drawn as shown in Figure 3 and Figure 4. In fact, the result is two curves similarly symbolizing the average value of the trade in US dollar and the average weight of the trade in kilogram in each year between each pair of countries among 125 countries whose data is available as denoted in Figure 3 and Figure 4 respectively.

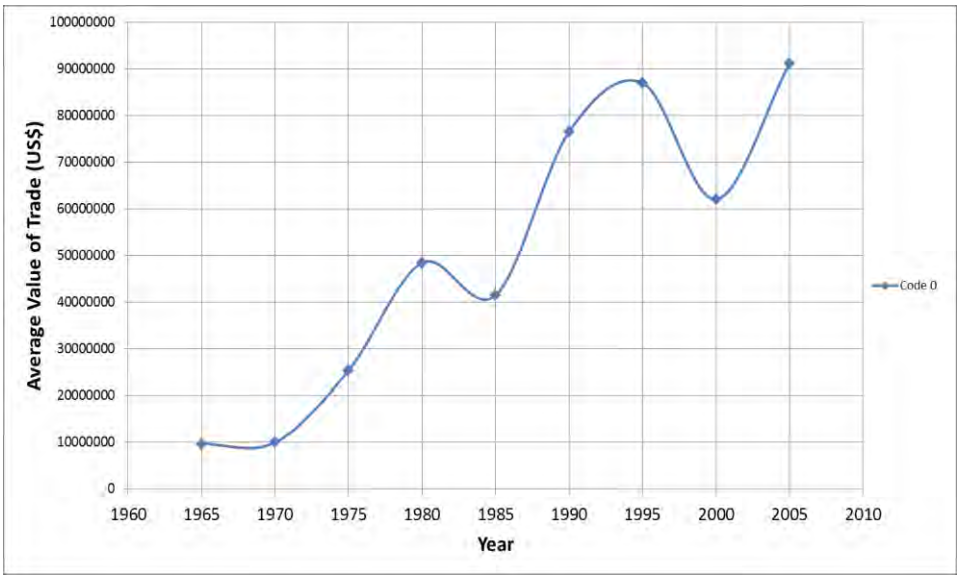

Figure 3: The average value of trade during 1965-2005, Food and Live Animals

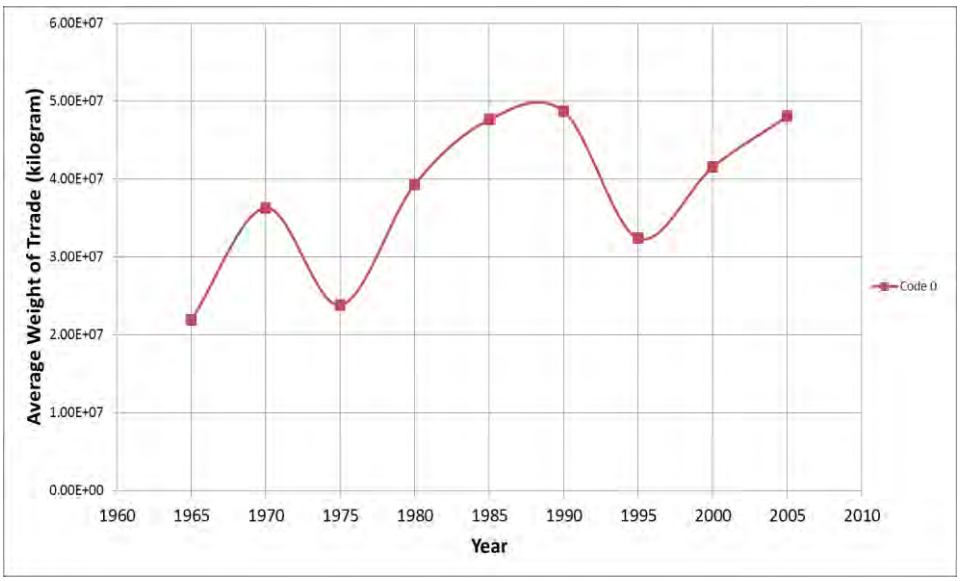

Figure 4: The average weight of trade during 1965-2005, Food and Live Animals

According to Figure 1, the value of the trade of each subdivision increases generally. Albeit there are two striking declines in the vicinity of 1985 and 2000, according to the regression models indicated in

Table1, the trend of variations in the value of the trade for each subdivision is ascending. In addition, the highest value of trade belongs to code 01 representing meat and meat preparations whose slope of linear regression model is also the most ascending in proportion to the slopes of other subdivisions' linear regression models as indicated in Table 1. According to Regmi, with increased urbanization and higher disposable income among urban residents, the demand for meat, horticultural, and processed products is expected to increase among developing countries (Regmi, 2001). Inasmuch as there are numerous developing countries among the 125 selected countries for this research, according to Figure 1, the higher value of meat compared to the other products can be justified. In other words, the posed demand has brought about a noteworthy increase in the value of the trade of meat and its preparations according to Figure 1. Furthermore, the values of trade for Code 01 through Code 05 consisting Meat, Dairy Products, Fish, Cereals and Vegetables/Fruits have increased drastically since 1985 to 2005 rather than other subdivisions in this period as shown in Figure 1. Likewise, according to Table 1, the trend of the value of the trade of aggregate food products, namely Code 0, is ascending. Moreover, similar to its subdivisions, there are two noticeable declines in 1985 and 2000 in the value of the trade of Code 0 as indicated in Figure 3. As Gehlhar and Coyle cited, factors of growth on the supply side like expansion in the supply of skilled labor, income growth on the demand side, and barriers to trade such as transportation costs contribute in the variations of food trade in the world (Gehlhar and Coyle, 2001). Granted that the factors mentioned by Gehlhar and Coyle have contributed to the trade of food, these elements have totally increased the value of the trade among these 125 countries.

In spite of the fact that the trend of each subdivision's value of trade is ascending, regarding the weight of the trade, according to Table 1, only the trends of 7 subdivisions were ascending and those of 3 other subdivisions comprising Live Animals, Fish and Feeding Stuff for Animals which are related to animals were descending. Among 10 different subdivisions, Code 04 and Code 05 representing Cereals and Vegetable/Fruits respectively, have the highest weight of trade rather than other 8 subdivisions as exhibited in Figure 2. Even though the variations of the weight of the trade are not as consistent as those of the value of the trade, the trend of the weight of the trade of aggregate food products, namely Code 0, is ascending according to Table 1. Also, concerning the trends computed for the weight of the trade, the most descending slope belongs to Feeding Stuff for Animals and the most ascending slope belongs to Cereals. As it can be observed in Table 1, except for 3 subdivisions in the domain of weight, other codes pursue ascending trends among which, the slope of the trends are more drastic for the value of the trade rather than the slope of the trends for the weight of the trade, in particular since 1985.

In respect to the reliability of the models which is determined by the coefficient of determination, R^2, the models of the value of the trade possess higher coefficients of determination implicating higher reliability, whereas the coefficients of determination for the models of the weight of the trade are less. The incomprehensiveness of the data of the weight can be considered as a reason for the lowness of the coefficients of determination for the models of the weight of the trade. Especially regarding the weight of the trade of 3 subdivisions including Live Animals, Fish and Feeding Stuff for Animals whose trends are descending, the amount of the coefficients of determination are less than 0.1. Thus, these three models do not explain the reliability of the trade trends of the weight of these three subdivisions explicitly.

Code	Definition of each Code	Value of Trade		Weight of Trade	
		Linear Regression Models (Thousand US$)	R^2	Linear Regression Models (Ton)	R^2
00	Live animals except Code 03	$V = 74.4t - 10^5$	0.440	$W = -15.2t + 3*10^4$	0.025
01	Meat	$V = 398.5t - 8*10^5$	0.844	$W = 52.6t - 10^5$	0.313
02	Dairy products	$V = 268.5t - 5*10^5$	0.860	$W = 42.8t - 8*10^4$	0.369
03	Fish	$V = 331.8t - 7*10^5$	0.833	$W = -38.1t + 8*10^4$	0.051

04	Cereals	$V = 215.8t - 4*10^5$	0.795	$W = 278.7t - 5*10^5$	0.335
05	Vegetables and fruits	$V = 353.2t - 7*10^5$	0.859	$W = 136.2t - 3*10^5$	0.575
06	Sugar and honey	$V = 75.2t - 10^5$	0.506	$W = 82.8t - 2*10^5$	0.806
07	Coffee, tea and etc.	$V = 132.1t - 3*10^5$	0.812	$W = 17.7t - 3*10^4$	0.366
08	Feeding stuff for animals	$V = 141.6t - 3*10^5$	0.887	$W = -119.7t + 2*10^5$	0.081
09	Various edible products	$V = 122.2t - 2*10^5$	0.883	$W = 50.9t - 10^5$	0.733
Total	Food and live animals	$V = 2000t - 4*10^6$	0.855	$W = 489.1t - 9*10^5$	0.440

Table 1: Linear regression models for 125 countries during 1965-2005

Conclusion

The study exhibited the significant variations in the value and in the weight of different food products. The trends of food products, namely Food and Live Animals and its 10 subdivisions were examined in two domains of the value of the trade and the weight of the trade for 125 countries throughout Asia, Europe and Africa during 1965 to 2005. The trend of the value of the trade for each subdivision along with the trend of the value of the trade of aggregate food products, namely Code 0 was ascending. Nonetheless, there were two declines for 1985 and 2000 for each subdivision and also for the aggregate food products explicating a decrease in the value of trade in these two years. Furthermore, the highest value of trade belonged to meat and meat preparations whose slope of linear regression model was also the most ascending in proportion to the slopes of other subdivisions. Besides, increase in the value of trade for Code 01 through Code 05 was drastic since 1985 to 2005 rather than that of other subdivisions in this period.

Although the trend of the weight of the trade of aggregate food products, namely Code 0, was ascending, the slope of this trend was less than that of the value of the trade. Moreover, the most ascending slope of trend for the weight of the trade of subdivisions belonged to Cereals and the trends of the weight of the trade for 3 subdivisions consisting Live Animals, Fish and Feeding Stuff for Animals were attained descending among which, the most descending slope belonged to Feeding Stuff for Animals. Notwithstanding, on account of low coefficient of determination, the three models gained for these subdivisions could not reliably interpret the trends of the weight of the trade. Also, Cereals and Vegetable/Fruits, had the highest weight of trade rather than other 8 subdivisions since 1965 to 2005. Meanwhile the regression models offered for the value of the trade, were more reliable than those of the weight of the trade.

Finally, it can be conclude that despite increase in the value of different subdivisions of food and live animals since 1965 to 2005, the weight of the trade has increased except for 3 subdivisions as well. In other words, the trends of the variations of trade for value and weight have been in the same direction except for 3 subdivisions and increase in the value of trade has not reduced the weight of the trade. Besides, when the aggregate food products, namely Food and Live Animals, was examined, the trends of the variations of trade for value and weight were in the same direction.

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THE QUALITY OF OUTSOURCED LOGISTICS SERVICE IN COLLECTIVIST COUNTRY: A LITERATURE REVIEW

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Abstract
This paper highlights on the emerging needs to expand theories from different national culture perspectives. Highlighted key content include the shortcoming of the work in the logistics service quality, the importance of logistics service quality towards customer satisfaction and the needs to explore logistics service quality from the perspective of the collectivist society. This study also highlights on the differences between collectivist and individualist society and works planned for extension of the study.

Introduction
Many authors identified and addressed that there are differences on how theories are functioning in various national culture (Hofstede, 1993; Kristal, Mark, & Sheu, 2008; Schermerhorn, 1994; Abdullah, 1996; Childerhouse et al., 2010). National culture is defined as the collective programming of the mind that distinguishes the members of one group or category of people from others. Mentzer, Myers, & Cheung (2004) had acknowledged that it is important to expand the knowledge on how logistics service quality and customer satisfaction functioned in different national culture.

Mentzer et al., (2004) addressed that logistics activities are subject to culturally influenced preferences prevalent across the globe, especially the general influences such as timeliness and responsiveness. Mentzer et al., (2004) added that the majority of study are emphasizing on the identification of customer character related to segmentation of tangible goods, rather than services. Riddle (1992) stated that firms that are able to master the cultural elements through learning and training have the opportunity and advantage to perform well in the market. There are several works conducted to understand cultural values function in business, for example Yang, (2011) have studied in detail about the importance of Guangxi (Chinese cultural value) in businesses. Specifically there are a limited number of works available to understand logistics service quality and customer satisfaction in a collectivist society.

Collectivist culture is a closed group orientation. The people believe that their fate is strongly linked to others, channelling personal goals for collective goals and rarely separate or get out of groups (Cannon, Doney, Mullen, & Petersen, 2010; Hofstede, 2011). They favour harmony and cooperation with similar other in an interdependent situation. Collectivist society values on belongingness, preserving public image and conformity. Among countries that have collectivist orientation includes Argentina, Armenia, Belarus, Brazil, Bulgaria, China, El Salvador, Egypt, Greece, Georgia, India, Indonesia, Japan, Korea, Lebanon, Portugal, Romania, Russia, Ukraine, Saudi Arabia, Serbia, Singapore, Taiwan, Turkey, Malaysia, African countries (Zambia, Kenya, Uganda and Somalia), Israel and Poland (Hofstede, Hofstede, & Michael, 2010). While individualist culture are an “open-group” societies. People consider themselves independent of others, pursue personal goals over group goals. The norms emphasize assertiveness and confrontation in interdependent situations. Individualist society values promote autonomy, competition, freedom, independence and achievement. Countries that are among individualist countries include Germany, Austria, Switzerland, Canada, Australia, United Kingdom, Italy, France, Ireland, Poland, Czech Republic, Finland, Estonia, Hungary, United States, The Netherlands, Belgium, Luxembourg and South Africa. Table 1 presents key differences between individualist and collectivist society.

COLLECTIVIST	INDIVIDUALIST
Use the word “I” is avoided	Use of the word “I” is encouraged
Interdependent self	Independent self
On personality tests, people score more introvert	On personality tests, people score more extravert
Showing sadness is encouraged and happiness discouraged	Showing happiness is encouraged and sadness is discouraged
Slower walking speed	Faster walking speed
Consumption patterns show dependence on others	Consumption patterns show self-supporting lifestyles
Social network is primary source of information	Media is primary source of information
A smaller share of both private and public income is spent on healthcare	A large share of both private and public income is spent on healthcare
People with disabilities are a shame on the family and should be kept out of sight	People with disabilities should participate as much as possible in normal life

Source: Hofstede. G, Hofstede G.J, Minkov, M., (2010) Cultures and Organizations, Software of the Minds, Intercultural Cooperation and Its Importance for Survival

Table 1: Key differences between collectivist and individualist societies language, personality and behaviour

The original logistics service quality (LSQ) theory was developed by Mentzer, Flint, & Hult, (2001). The LSQ theory is based from the view of individualist country, the core question that guided this study can be stated as follows: Do the Malaysian cultural values have any influence on the manufacturers" satisfaction towards the quality of outsourced logistics service? The purpose of this paper is to review on the preceding theoretical understanding on the components of quality of logistics service and how does the customer satisfaction emerged among the Malaysian manufacturers.

Literature Review

National Culture and Logistics & Supply Chain Management Study

Globalization are mentioned as the main reason that heightened the concerns about importance of understanding cultural differences. Table 2 presents the summary of logistics and supply chain research related to national culture study. In logistics and supply chain context, listed works have acknowledged the significant impact of cultural differences and promote to extend the understanding into various discipline and theories. For example in the work of Mentzer et al., (2004) which have addressed that while the fundamentals of logistics service are frequently addressed, understanding the application of logistics service strategies in a global context is still in the early stages of development. He stresses that it is the role of future research to continue to investigate the influence of LSQ in a global context, particularly addressing the research propositions presented.

To support this view, overall literature review by Schoenherr, (2009) have identified that there are 4 predominant themes emerged in the global study; Important highlights include that there is indication that an approach that works perfectly in one country may lead to a considerable failure in another country. Schoenherr (2009) suggested future research to continue explore and update specific national logistics and supply chain management settings. Next, in the work by Laskowska-rutkowska, (2009) have pointed out further details where National and organizational culture have a significant impact on the success of cooperation between companies in the supply chain. For example, countries, whose traditional culture has favoured cooperation may benefit from their “cultural value added." On the other hand, countries where strong individualism and a confrontational approach predominate may find themselves in a less favourable position. In this case, the chances that a partnership in the supply chain will be successful may be increased by the creation of an organizational culture focused on cooperation and by the use of tools that help define partnership goals and its optimum “depth."

Author	Approach and Context of Study	Theoretical Origin	Variables
Mentzer et al., (2004)	Conceptual / Global Context	Logistics Service Quality	National and regional characteristics, Organizational Characteristics, Perception of order placement activities, Perception of order receipt, Satisfaction level response
Schoenherr, (2009)	Literature Review. Global Logistics and supply chain management	Challenges of Global Logistics and Supply Chain Management	NIL
Laskowska-rutkowska, (2009)	Literature Review. Supply Chain Management	National Culture, Organizational Culture, Supply Chain	NIL
Childerhouse et al., (2010)	Survey, Global Supply Chain Management	National Culture	Anthropological approach observing SCM behaviour within natural setting. behaviour type

Table 2: Summary of logistics and supply chain research related to national culture study

Further search in International Journal of Physical Distribution (IJPDLM) and Logistics Management on related national culture and logistics studies. Initial results in IJPDLM based on "National Culture" keyword resulted to 119 related paper. While In JBL there are 50 related results. Further screening to select the closest topic which do study about national culture excluding work on organizational culture, total quality management culture, Information system culture results to 11 selected research. Based on the searches there are eight (8) main research direction related to logistics studies from national culture perspective. They include personnel skill requirement (Razzaque, Shafreen, & Sirat, 2001), Innovation Management (Busse & Wallenburg, 2011), China Based study (Jiang & Prater, 2002; Tian, Ellinger, & Chen, 2010; Wang & Kess, 2006; Zhang & Huo, 2013), Supplier and Customer Relationship (Golicic, 2007; Rinehart, Lee, & Page, 2008), Loyalty (Wallenburg, Cahill, Goldsby, & Knemeyer, 2010); support system for global logistics (Koh, Saad, & Arunachalam, 2006), importance to consider culture (Daugherty, 2011; Forslund, 2006; Tokman & Beitelspacher, 2011) and finally is behavior, decision making and judgment when involve different culture (Carter, Kaufmann, & Michel, 2007). Paper begin as early as 2001 and the highest is within the year of 2011 and there is only one recent work in 2013. The highest research based on this findings is about the China based study, this indicates that in cultural perspective there are active works about china culture and values in logistics and physical distribution journals.

Development of Logistics Service Quality

After identifying the growing needs to consider on how culture element may effect on practices and theories. This section explains on how the Logistics Service Quality (LSQ) work by Mentzer, Flint, & Hult, (2001) were developed. LSQ consists of nine (9) constructs to determine customer satisfaction. It includes Personnel Contact Quality, Order Release Quantity, Information Quality, Ordering Procedures, Order Accuracy, Order Condition, Order Quality, Timeliness and Order Discrepancy Handling.

Starting from the mid 1990"s, logistics capability has evolved, from the traditional contribution in supporting marketing function, cost reduction and now has exalted to the capability to support or produce quality (Innis & La Londe, 1994). Thereby, the quality in logistics may further enhance greater satisfaction and loyalty (Mentzer et al. 1999; Saura et al. 2008). Service quality theory was mainly established as a means to measure the difference between what a person"s expectation on service

and the perception that he/she may express after experiencing the service (Parasuraman, Zeithaml, & Berry, 1988).

Bienstock et al. (1997) is among the early scholars that have integrated SERVQUAL concepts with logistics function. Bienstock et al. (1997) developed a model known as physical distribution service quality (PDSQ). The construct of PDSQ is a valid, reliable scale gathered from the perception of purchasing managers assessing the service quality of in-house logistics providers (Mentzer, Flint, & Kent, 1999). The PDSQ model was developed by using similar qualitative and quantitative methods conducted by (Parasuraman, Zeithaml, & Berry, 1988). The PDSQ theory consists of three variables that are timeliness, availability and condition (Bienstock, Mentzer, & Bird, 1997)

Later, Mentzer et al. (1999) expanded the PDSQ model further into logistics context by considering the need of combining both the technical and functional qualities of the logistics service. Technical quality is expressed as the service that is technically acceptable and leads to concrete results (Mentzer et al. 2001). On the other hand, functional quality includes the way the customer is treated during the service provision process (Mentzer et al. 2001). There are nine original variables, namely personnel contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, order discrepancy handling, and timeliness (Mentzer et al. 2001).

In addition, Mentzer et al. (1999) has studied the LSQ instrument from the view of the customer instead of the providers. Whereby, the developed LSQ measurement was tested in the United States largest military logistics providers (Defense logistics America, DLA). DLA users were the sample of the study that assessed the service quality delivered by DLA. The aim is to understand the different segments of value logistics service quality across the industry. Rafiq & Jaafar, (2007) tested and validated the LSQ instrument by surveying the users of third party logistics in the United Kingdom as a sample. Minor modification was made on the original constructs. Instead of assessing in-house logistics service only as by Mentzer et al. (2001), Rafiq and Jaafar (2007) assessed companies which used various types of the 3PL services (inbound, outbound, external 3PL providers) and different logistics providers. The results provided an overview of the level of the third party logistics service quality and its impact on the customer satisfaction. Saura, Francés, Contrí, & Blasco, (2008) also utilised the LSQ tools relationship with additional variables of information and communication technologies impact towards customer loyalty in the Spain context. In the Malaysian context, several authors have conducted a study to understand the quality programs in logistics functions among manufacturers (Zakaria & Fernando, 2010; Sohail, Sohal, & Millen, 2004). However, as to date, little empirical work is available for assessing the components of logistics service quality and its impact towards customer satisfaction within the collectivist society.

Research Gap

Previous work has concluded and confirmed that there are contradicting results from well-established theories (relationship theory, staffing, training) when it involves cultural values of Malaysian (Abdullah, 1996; Faisol & Jaafar, 2011; Schermerhorn, 1994b; Storz, 1999). In Malaysia, numerous studies have reported on the significant differences among cultures, especially between western countries and eastern countries (Faisol, Dainty, & Price, 2006; Faisol & Jaafar, 2011; Schermerhorn, 1994a). For example in general human resource training, according to Asma Abdullah in Schermerhorn, (1994) the training from western countries like USA would not go well with countries like Malaysia because it clashes with underlying values of politeness, softness, humility and “we “ orientation. The trained personnel might not be able to apply his new skills comfortably due to clashes of cultural values.

Another example related to logistics and supply chain in Malaysia is in the work of Faisol & Jaafar (2011). Whereby, they mentioned that, in a collectivist society particularly for Malays in Malaysia, a technical aspect such as the quality of service provided and punctuality was not significant in securing future project with the same customer. However, it was the relational elements such as a personal relationship, emotion, values and social interaction that were most vital. The decision of project continuation was not just based on performance (on time arrival, no damages, accurate builds), it also depends on “whom you know” than “what you know."

While most studies suggest balance of power is crucial for good relationship, the work of Faisol & Jaafar (2011) have proven otherwise where in the Malaysian culture where power distance is acceptable, and it is contributors to faster and good relationship. Faisol & Jaafar (2011) also discovered issues of how national culture is influencing the relationship whereby in Malaysia context,

particularly among Malay construction industry, there are significant roles of national culture in influencing relationship between providers and users.

The study indicates that the existing inter-organizational relationship models in the literature did not accord with Malaysian organizations. Faisol & Jaafar (2011) suggested considering a more culturally sensitive models which fit particular race (in his case Malays). One of the significant elements highlighted in the framework is indebtedness („terhutang budi") and „malu" (shame) which is two important Malay values, in which they act as antecedents to the relationship. Earlier in 2010, Faisol conducted a study on relational contracting norm in Malaysian construction Supply Chain. Part of the study reveal the difference between the United Kingdom and Malaysian construction industry. Key elements are distinguishing both geographical separated region is the existence of personal relationship," emotion elements such as feelings of „bertolak ansur" and „bertimbang rasa„ make others feel happy as well as values of honesty and „budi„.

Conclusion

From this literature review, we can conclude that there are different elements of logistics service quality and customer satisfaction when it is functioning in the Malaysian National Culture. These unique phenomena require an in-depth understanding to enhance and take advantage on the capability and potential. The findings signify that it is important to delve further into the subject matters, which is to investigate the logistics service quality, customer satisfaction in Malaysia national culture. The study is not without limitations. First, only academic journal papers were included in the review as they are considered to be the highest level of research for acquiring information and disseminating new findings. Other relevant knowledge concerning this topic might also be found in conference proceedings papers, master"s theses, doctoral dissertations and textbooks. Adding knowledge from these sources might have altered the results or validated the conclusions made in this article.

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CONSIDERATION ON THE SUPPLY CHAIN APPROACH FOR RESTRICTED SHOPPERS IN A HYPER-AGED SOCIETY -A CASE OF ONLINE WHOLESALING SYSTEM-

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Introduction

Since world population has been ageing, some issues including health, wealth and mobility of the elderly have been under the spotlight. In addition to those general issues, the current situation with restricted shoppers would be sensational issue in Japan, a hyper-aged society. The restricted shoppers refer to those who have difficulties in daily shopping and they are called even more sensationally as “shopping refugees” in Japan.

Unlike “food deserts” issues in Europe and U.S., the restricted shoppers’ problems in Japan derived from the increasing withdrawal of retail stores and shrinking public transport in especially depopulated sparse rural area. The elderly cannot easily access to the stores nor handle the goods because of their physical features.

Recent studies have showed some measures for the restricted shoppers, such as rolling stores and delivery service (Sugita, 2008; Takahashi, 2012; Lee, 2013 a). Lee (2014) also suggests that government and volunteers as well as companies should be involved to help the restricted shoppers from the respective of humanitarian logistics.

Above measures can improve the situation because they can give the elderly an access to retail outlet right in front of their doors and/or delivery service. That would be considered as one of the logistics missions in an ageing society. Supplying goods is a basic mission of logistics and this would be quite important in the last-mile, especially in an ageing society.

Although the last-mile logistics is essential to help the restricted shopper, this paper focuses on the measures for helping retailers. That is because some retailers are also underserved by wholesalers or manufacturers. The retailers, often in sparse rural area, have been “restricted retailers” or “stocking refugees”. They cannot help but order a small amount since the demand in sparse rural area in an ageing society has been decreasing. That makes the retailers find themselves as restricted retailers, who have difficulties in stocking or purchasing goods from wholesalers or manufacturers. The restricted retailers are forced to end up withdrawing their business, which makes consumers the restricted shoppers. In order to help the restricted shoppers in an ageing society, measures for the restricted retailers should be discussed from the perspective of supply chain.

This paper, therefore, aims to examine the measures for the restricted retailers. With this purpose, a cooperative solution in supply chain is introduced.

Review on the measures for restricted shoppers and Supply Chain Approach

Issues on restricted shoppers in an ageing society

World population has been ageing. Although longevity is a reason for celebration, an ageing society has some challenges. Japan, as a hyper-aged society, has also some issues that there are so many people who have troubles in daily shopping. They are called in Japan as restricted shoppers. According to METI (Ministry of Economy, Trade and Industry, 2011) and Food Access Research Team of MAFF (Ministry of Agriculture, Forestry and Fisheries, 2011), the ratio of restricted shoppers would be 5% to 35% of Japanese population.

There are several reasons for being restricted shopper in sparse rural area. First of all, the shrinking retailers gave the poor accessibility to the elderly. Another reason is that a public transportation network has dwindled. Dysfunctional community and single elderly people are also major causes. The elderly, in general, could neither drive by themselves nor walk a long way. Furthermore, they have no one to help them (Lee, 2013 b).

These reasons raised the issues on the restricted shoppers in Japan. Many elderly people in a hyper-aged society appear to be in distress. They face two difficulties in daily shopping; difficulty of gaining access to a store and carrying goods to their house (Fig.1).

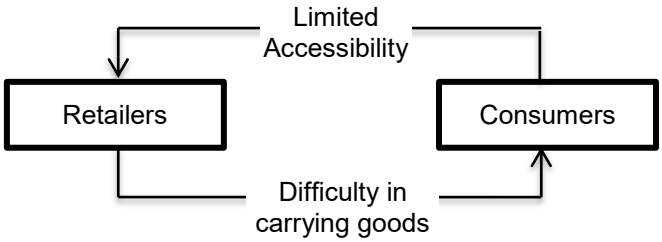


Figure 1: Restricted shoppers' problems

Review on the Measures for Restricted Shoppers

Rolling stores or mobile shops have significant roles to alleviate the burden of restricted shoppers. Rolling stores refer to movable outlets literally. They use a truck for selling grocery, daily necessities, and miscellaneous goods, so that they can go close to the elderly's door. A rolling store gives restricted shoppers a physically direct access to outlets and laboriously significant alleviation of carrying goods. In Japan, many experiences of rolling stores -as one of measures for restricted shoppers- have been observed especially in rural areas.

Another one is home-delivery service. Home-delivery service has been common in Japan with an expansion of e-commerce. The elderly, however, is not quite familiar with e-commerce, so that some retailers provide an acceptance of telephone ordering system. This type of home-delivery service is often observed in rural areas by small and middle sized retailers. On the other hand, several large-sized retailers have started home-delivery service -as one of customer service- in urban areas. They give a delivery service in two ways. Consumers can request the service at a store. Customers can also order on a net-store if the retailer is a bricks-and-clicks company.

As described above, rolling stores and home-delivery service are obviously reliable measures for restricted shoppers. And these measures could also be a new business chance in a hyper-aged society, although they still have some challenges such as profitability.

Another Issue on Restricted Retailers

The most primarily reasons for being restricted shoppers is the limited accessibility to retail outlets. In other words, they have no retail stores in their neighborhood. The number of retail stores in Japan hit the pick in early 1980s and has been decreasing steadily. This number decreased by 34% to about 1.1miillion in 2007 from the peak (about 1.7million in 1982). By the type of retailers, though, individual bodies declined by 56%, in contrast to the 30% increase of incorporated bodies. On the other hand, the spaces for sales have been increasing and the annual sales of retailers have risen up to about 50% (Fig.2). This implies that the issue of limited accessibility for restricted shoppers are related to the withdrawal of small-sized individual retailers.

According to an analysis on the changes of retailers between 1994 and 2007 by the number of staffs, there are 34% down of the number of stores with 1-2 staffs and 46% down of annual sales (Table 1). In spite of decreasing number, they have still 44% in ratio in Japan. As of 2007, Japanese retailers consist mostly of fewer than 4 staffs stores that would be individual bodies. Those small-sized individual retail stores are called "neighborhood stores" hereinafter.

Why have neighborhood stores in Japan been decreasing, then? Komoto (2009) considers the decrease in sales as one of primary factors. And he points the effect of increasing large-sized retailers. He also adds ageing entrepreneurs as well as the lack of innovations in neighborhood stores.

It is, however, should not be overlooked that neighborhood stores in spars rural areas have difficulties in restocking or purchasing goods to sell to customers. They tend to make a small-lot order because they do not have much demand of customers. They are forced to suffer from searching some wholesalers that respond to any order without compulsory minimum quantity or extra charge. In

addition to a difficulty in ordering small lots, they also face a low efficient delivery no matter who conducts it, which brings them a budget impasse (Fig. 3).

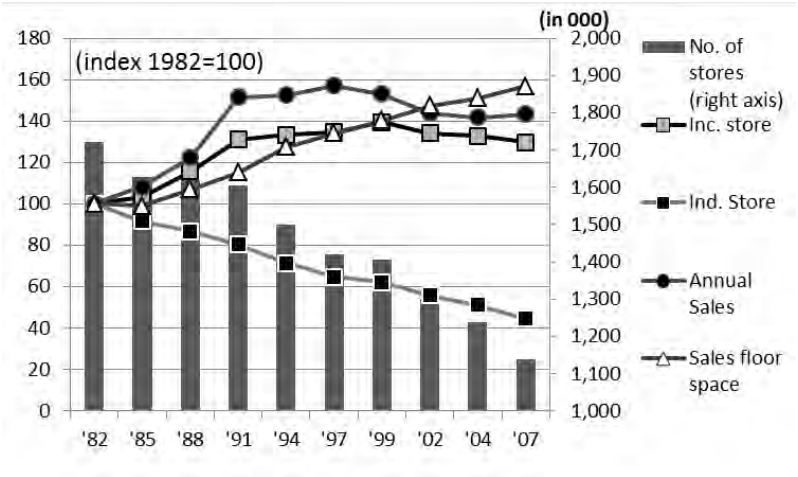


Figure 2: Trends in retailing in Japan
Data: Commercial Statistics, Ministry of Economy, Trade and Industry, Each year

No. of staff	No.of stores	Annual sales
1~2	▲ 34.1	▲ 45.6
3~4	▲ 31.9	▲ 40.7
5~9	▲ 9.3	▲ 17.2
10~19	27.6	15.4
20~29	22.8	4.6
30~49	10.1	3.2
50~99	50.6	46.4
100~	64.5	5.9
Total	▲ 24.1	▲ 6.0

Table 1: Changes in the number and the annual sales of retail stores (2007/1994)

Data: Commercial Statistics, Ministry of Economy, Trade and Industry, Each year

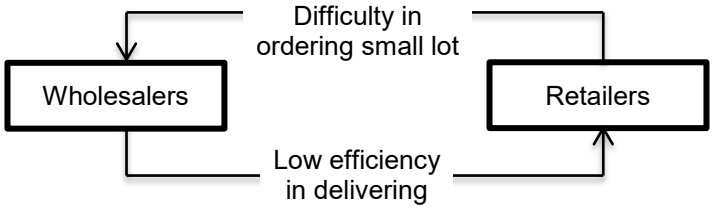
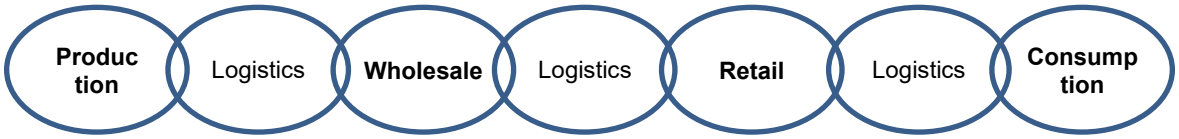


Figure 3: Restricted retailers' problems



- Issues in a hyper-aged society: (on retailers and customers as this paper's concern)
  - small lot order to wholesalers
  - delivery efficiency
  - limited accessibility to retail outlets
  - carrying goods to house

Figure 4: Functional supply chain and issues in a hyper-aged society

The necessity of supply chain approach

All goods are flowing from producers to the final consumers. In terms of player, producers or manufacturers create goods and sell them to wholesalers and/or retailers. Wholesalers purchase goods from manufacturers and sell them to retailers. Later, retailers sell goods to the consumers. Logistics companies provide transportation, inventory management service, and etc. to other players. These connections are called a supply chain. A basic supply chain is shown in figure 4 in terms of functions. Although there is no commonly agreed definition of supply chain as Waters (2010) notes, it is near-universal recognition that relationships and cooperation between the players are essential in a supply chain. Supply chain approach, therefore, is defined as a cooperation initiative that is conducted by plural players on a supply chain. The players can expect a win-win business from supply chain approach.

If any function or player happens to fall into dysfunctional situation, the whole supply chain will be out of gear. That is because “a chain is no stronger than its weakest link”. Japan as a hyper-aged society may be experiencing a dysfunctional supply chain due to the steadily decreasing small-sized retail stores. As described above, there are many restricted shoppers especially in depopulated areas where have few stores. It could be described in figure 4 that the retail chain and the logistics chain are the weakest links. This brings the measures such as rolling stores and delivery service.

Such efforts are expected to support the restricted shoppers. However, it is even more important that retailers can manage to play their own role in a supply chain and, as a result, consumers can easily access to the stores. A small-sized retailer, for instance 1-2 staffs store in rural area, is in general a private business, so that it has a limitation in managing business and gathering information. It needs to cooperate with other players, expecting a win-win business.

Retail industry in Japan has increased since 1980s in terms of annual sales, sales floor space and the number of large-sized stores. Several largest retailers including chain stores have tried to control their supply chain, so that they prefer direct deals with manufacturers. Urakami and Wu (2010) point out the trend toward bypassing wholesalers has accelerated rapidly in recent year. That resulted in struggles of wholesalers. For their competitive advantages, wholesalers have supported largest retailer with various assortment of merchandise, secure transportation, and physical activities in stores and etc.

These wholesalers’ supports would be a trigger to contribute to survive from the competition, as Sugimoto and Nakanishi (2002) point out. Wholesalers should find themselves as partners with retailers in a supply chain. Especially in a hyper-aged society, small-sized retailers have a difficulty in ordering small lots to wholesalers as well as traditional disadvantages. Therefore, the partnership or cooperation between wholesalers and retailers is essentially needed. That is also the importance of supply chain approach: the players in a supply chain can expect a win-win business and the customers can easily access to a retail store.

A case of cooperation on an online wholesaling system

Two players of Kokubu and Yamato

Here is a fascinating case of measure to help neighborhood stores in sparse areas restock in small amount. That is called “Kokubu net-wholesaler”, which was established in 2010 by the cooperation between KOKUBU & CO., LTD (hereinafter called Kokubu) and YAMATO TRASNPORT CO., LTD (hereinafter called Yamato).

Kokubu is one of leading wholesalers in Japan. It has been engaged in food distribution for more than 300 years. In 2013, it made 1,567 billion yen in sales, representing a rise 4.3% year-on-year. Among its sales, food products account for 51%, alcoholic beverages 44% and others 5%. In more details, processed food products stand out 73% out of food sales and frozen/chilled products 11%. In alcoholic beverages, beer and beer-flavored alcoholic beverages are 56% and others 44%.

Considering its food distribution activities as a part of the basic infrastructure of a society, Kokubu has been trying to support retailers with advice on products, the allocation of shelf space, and other general things about store.

Yamato is also one of the biggest transport companies. It was established in 1919 as a local trucker. It is its home delivery service “TA-Q-BIN” that makes Yamato boost its value as well as revenue. TA-Q-BIN started in 20th January 1976 with 11 parcels and sequentially expanded to major cities across

Japan. Its transport network reached remote isolate islands of the *Izu* islands in 1996 and finally completed its national wide network to the Bonin Islands in 1997.

Yamato delivered about 1.7 billion parcels in FY 2013. A survey conducted by MILT (Ministry of Land, Infrastructure, Transport and Tour) shows that Yamato's record accounted for about 43% in total home delivery service in Japan in FY 2012. Operating revenue from delivery in FY 2012 was 1,028 billion yen, increasing by 1.3% year-on-year. Yamato provides home delivery service 365 days a year and basically makes the parcels to be delivered on following day to consignee's house.

Since Yamato has placed importance on corporate social responsibility (CSR), it has been trying to contribute to the issues in an ageing society. For instance, Yamato has been working with a local government and local stores to revitalize a so-called "marginal village", where a majority of the population is aged 65 or over, through delivering the ordered goods to the customers' home and doing watch-over services. This is nothing less than a measure for restricted shoppers.

A build of "Kokubu net-wholesaler"

Kokubu says in an interview by the author in May 2014 that it made a start on building "net-wholesaler" in 2009, assuming that internet would still have a high possibility of being more used. Since KGC (KOKUBU GROCERS CHAIN CO., LTD), one of Kokubu's subsidiary companies, has operated and supported voluntary convenience store chain named Community Store, Kokubu noticed the demand from small-sized retailers. Consequently, Kokubu planned an online business with an aim of initiating an ongoing relationship with small-sized retailers, which had been difficult to establish before, and turning out to support the restricted shoppers. Kokubu focused intensively on the demand from the following; neighborhood stores in an inconvenient location with no transportation, company store or concession stand, novelty goods seeker, and internet users for rare items.

While Kokubu has examined its plans, it has to manage logistics process and financial procedure. Generally speaking, wholesalers handle large-lot delivery to contracted retailers, so that wholesalers could avoid inefficiency of delivery and the risks of allowing credit. The net-wholesaler, however, would be accessed by unspecified users to order small lot. In the middle of 2010, when Kokubu discussed on logistics process with Yamato, two companies found that they had a common objective of supporting the restricted shoppers. Kokubu and Yamato, therefore, made a decision to establish an online wholesaling system in joint. Kokubu provides products and its company value as a leading food wholesaler, while Yamato engages in creation of the website, logistics process including sort and delivery, and payment system provided by Yamato group. Half a year later, Kokubu net-wholesaler is finally launched in the end of 2010. The net-wholesaler is an "e-procurement system" from the viewpoint of retailers.

Although Kokubu had alternatives of using the existing internet malls, it made a decision to target a niche market ordering small lots. It intended to play rolls as a wholesaler to support retailers, i.e., B to B. Kokubu declares that it has to manage to make a successful business with neighborhood stores. It says that the net-wholesaler goes with B to b, and b represents the small-sized retailers as its niche market. (Even though Kokubu targeted retailers, there is no limitation to access. An individual consumer can make an order from the net-wholesaler, which means B to C.)

Features and process of "Kokubu net-wholesaler"

The net-wholesaler has about 9,000 items on its website. Almost of the items are food products, alcoholic beverage and daily goods, which have been handled in Kokubu *Kantou* center located in *Ibaraki* prefecture. Others are perishable or special products such as fresh vegetables, fruits and local specialties. These items are shipped out from each distributor engaged with Kokubu.

Only subscribers are allowed to check the prices and order by the case. Subscribers do not have any cost or obligation. The number of subscribers has been rising to 20,000 for about three years. 80% of subscribers fall into business, primarily retail business such as grocery stores and restaurants, and 20% into institutions such as schools or community clubs.

Subscribers can make an order less than 50 items and 300,000 yen so as to be delivered at the given rates. The rates are settled even lesser than the minimum charge of standard TA-Q-BIN rates, which bestows a benefit upon subscribers. The ordered goods will be delivered after a couple of days.

The processes go basically as shown in figure 5; a subscriber orders from the net-wholesaler, net-wholesaler communicates ordering data to Kokubu *Kantou* center at 11 a.m. every day, the ordered goods are gathered by total-picking, Yamato takes the goods off the Kokubu center at 10 a.m. every day and carries them in *Ibaraki* Yamato center, Yamato engages in sorting, packaging and delivering, the ordered goods are delivered to the subscriber's house the following day in TA-Q-BIN service.

Regarding payment, consumers are offered alternatives by Yamato Financial Co., Ltd (YFC). Consumers may use a cash-on-delivery service and a credit card payment, which are now the general ways in TA-Q-BIN service. In addition to those general ways, sales-on-credit is guaranteed by YFC for the retailers after a credit check. It is sales-on-credit that wholesalers have offered but not for unspecified small-sized retailers. Kokubu can shift off the procedures and the risks of credit management. Meanwhile, the retailers can benefit from the cash flow.

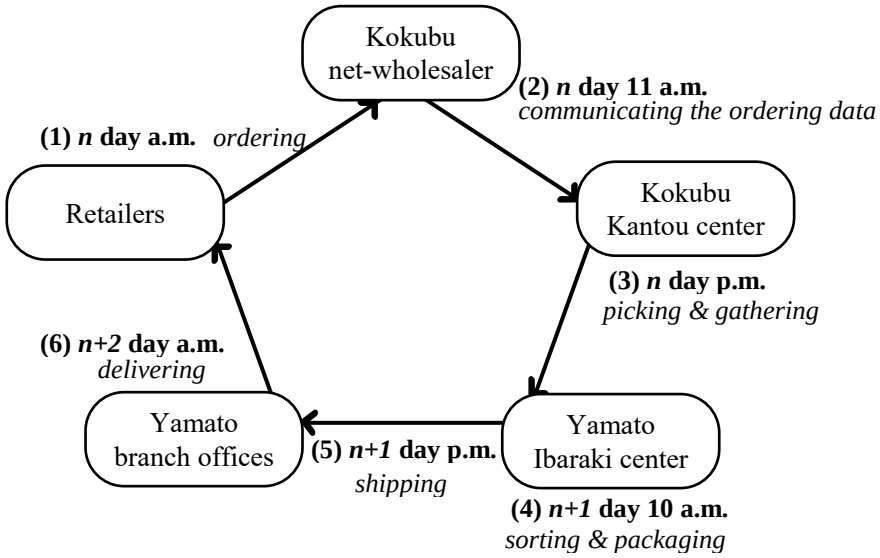


Figure 5: Processes of Kokubu online wholesaling system of net-wholesaler

Effect of the net-wholesaler

Among 3,000 ordered subscribers in 2013, retailers are the majority accounting for 38%, followed by food service like restaurants and wholesalers with 26% and 18% respectively. It is notable that neighborhood stores in remote islands and isolated hamlets have enjoyed the net-wholesaler. They purchase overall food products from the net-wholesaler. That implies the net-wholesaler would help not only the restricted retailers to restock and survive, but also the restricted shoppers to have an access to a store in their neighborhood.

Yamato (2014), as a contact point with consumers, reports the feedback from the retailers who had been too small to do business with major wholesalers. The retailers said that they feel lucky to join the online wholesaling system. They also added that if the neighborhood stores could procure stocks smoothly, the restricted shoppers would be eliminated. That is a collaborative supply chain approach to alleviate problems of the underserved retailers and consumers as well.

As mentioned above, supply chain approach may be required a win-win business for the players. For Kokubu, it could establish its online wholesale system at a low cost by virtue of the cooperation with Yamato, and expand efficiently and effectively its business to small retailers who had difficulties in doing business with. Wholesalers used to consider retail supports as a mission of wholesaler and now wholesalers reckon retail supports as crucial to boost its business in an ageing society. Kokubu can also benefit from its online business system by applying to other companies.

Yamato also gain advantages from the net-wholesaler while it is involved the system. The net-wholesaler would be one of steady markets for TA-Q-BIN. Moreover, Yamato is able to inspire the neighborhood stores to be a TA-Q-BIN agency in depopulated areas, in where delivery business is still

underdeveloped. Yamato has many different convenience store chains such as Seven-Elven, Family Mart, Circle K-Sunkus offering TA-Q-BIN in many cities. Those stores gather and distribute the parcels instead of Yamato. In a particular area without convenience store chain, however, it costs a lot to gather and distribute the parcels. If a neighborhood store would be an agency, Yamato will have advantages.

As like the net-wholesaler, when the companies benefit by cooperation and when significant problems in a society would be alleviated by the cooperative business, we can identify their cooperation as a win-win solution.

Challenges of the net-wholesaler

For further development of initiatives for the restricted retailers and the restricted shoppers as well, the net-wholesaler should be more discussed. For one, it may clear its double-handling; the orders are picked and gathered in Kokubu center, and are sent to Yamato to be sorted and shipped. In spite of knowing that double-handling may take more cost and time, Kokubu gave priority to large quantities business regarding the space and the labor in its center. Yamato has a sufficient space to sort the net-wholesaler's goods in its cross dock center. Nonetheless, it is necessary to improve the efficiency of the process. For another, the logistics network would be more discussed. It may take a long time and unnecessary travel to gather and deliver the ordered goods because the only one center handles the net-wholesaler. Preparing the increase of business, Kokubu and Yamato should go over their network.

Another challenge would be in its sales market. Kokubu should find its potential buyers in a hyper-aged society. Not only neighborhood stores but also facilities for the elderly like welfare institutions, for instance, will be users of the net-wholesalers. In addition, it is the rolling stores that will be important business partners to help the restricted shoppers. This is because a rolling store will be a common retailer in a hyper-aged society and it also has difficulties in assorting various items in small amount. In order to enhance its categories, Kokubu may establish a business partnership with other wholesalers and/or manufacturers such as medical supplies and daily sundries. This also would be another cooperative business in supply chain.

Conclusion

This paper first reviewed the significant issues on the restricted shoppers in a hyper-aged society and addressed the necessity of supply chain approach, focusing on the decreasing neighborhood stores as a primary reason of the issues. A practical initiative to support the increasing restricted retailers was described in a case of the net-wholesaler.

To sum up, the net-wholesaler system was efficiently established through the cooperation of the two players and has contributed to alleviate the difficulties for the restricted retailers in restocking. Meanwhile, the two players benefit from the system. This is a win-win solution of supply chain approach.

Despite of some challenges, the online wholesaling system like the net-wholesaler would be an effective and efficient measure in a hyper-aged society. And the success could come from the cooperation of the players on supply chain.

For further research, more practices and the possible applications should be discussed. And the analyses on the channels or supply chain management should be conducted from various viewpoints such as freight movement, inventory, business and distribution, in order to find more effects and challenges.

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THE NATIONAL SINGLE WINDOW IN MALAYSIA – THE INFLUENCING FACTORS FROM THE USERS PERSPECTIVE

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Abstract
The National Single Window (NSW) is a pertinent trade facilitation measure of Malaysian trade process in the sense of simplifying and harmonizing trade documents. This research seeks to identify factors that contribute to the effectiveness of its implementation. The influencing factors were organized under four (7) categories consist of regulatory policy, institutional support, user awareness, electronic system reliability, training, ICT support facility, simplified procedure. In addition, a total of 30 elements was founded under these seven factors. This research fills in the gap in trade facilitation research through the identification on the important role plays by government policy particularly in the national single window process, which was previously very lacking.

Introduction
International trade is generally an exchange of goods from one country to one another to fulfill the supply and demand between nations which evolved with broader supply chain activities. It is normally involves three things that moves together with cross border movement which are cargo, people and modes of transport either land transport, air transport, or sea vessel (Choon, 2011). Beyond the physical movement of the goods, there are detail information that entwined with the cargo being moves which carries the status of the cargo (ADB, 2009). Cargo information management plays an important roles to measure the supply chain process efficiency, public administrators' efficiency and legislative impact on market efficiency. Therefore, management of information at international border is very important because it will determine information traffic during clearance of goods at the border (Djankov, Freund, & Pham, 2006).

Background of the Study
Trade Facilitation
The logistics industry has undergone an evolution in management to improve its efficiency as demanded by trade atmosphere nowadays. There is more and more facility that has been developed by United Nation by its subsidiaries and other international agencies to encourage national and international trade. During 1998, trade facilitation was introduced by the United Nation as a potential solution to the world trade with the objectives of simplifying the trade process and minimizing transaction costs in international trade while maintaining effective levels of government control. Trade facilitation defined as *"systematic rationalization of customs procedures and documents. In a broader sense, it covers all the measures that affect the movement of goods between buyers and sellers, along the entire international supply chain"* (ADB, 2009). Even more important, from a trade facilitation action agenda is the establishment of a single window will force authorities to collaborate and streamline their processes, to collaborate and consult with the business community and in the best of cases also lead to coordinated border management, cutting lead time not only in the administrative procedures but also in the actual border-crossing (Pontén, 2011).

Single Window
Single Window is a trade facilitation strategy to enable cross border trade by practicing single location or entry point to manage regulatory documents or information for import, export and transshipment cargo. It is established that by having single window traders will enjoy efficiency time and cost saving. According to Economic Commission of European recommendation 33 Single Window defines as *"A facility that allows parties involved in trade and transport to lodge standardize information and documents with a single entry*

point to fulfill all import, export and transit regulatory requirement. If information is electronic then individual data elements should only be submitted once" (UN/CEFACT, 2005)

The concept is recognize and promoted by several world organization that are concerned with trade facilitation among others are United Nation Economic Commission of Euro (UNECE), United Nation Centre of Trade Facilitation and Electronic Business (UNCEFACT), World Custom Organization (WCO) and Association of Southeast Asian Nations (ASEAN).Single Window is a system which carried out accustom to local culture and the Logistics industry situation whereby the medium of information transfer are based on both electronic and hard copy documents for the formalities (UN/CEFACT, 2005). Data and document exchange for cargo delivery always involves big volume of transactions through its various agencies (Grainger, 2010a). This situation normally leads to negative impact where it's allowed for unfair practice and undesirable act due to the expose chances in order to create good governance [8]. Therefore, this system is very consistent with trade atmosphere because it's create systematic working environment as they gather important agencies in the process of custom clearance in the international border under one nucleus administration (Choon, 2005). So, the existence of the system supports an efficient movement of physical goods.

Component in Single Window Delivery

The emergence of National Single Window in Malaysia was initiated from the adaption of trade facilitation measures developed by UNCEFACT purposely to facilitate trade through effective management of information (UN/CEFACT, 2005). Thus, a committee has been set up by the Ministry of International Trade and Industry that brought to the appointment of Dagang Net Technologies Sdn Bhd to serve as national IT service providers to develop a reliable framework for the operation of Single Window in Malaysia since mid 90's. Since then, Dagang Net has become the sole assessment service providers to design, develop, manage and operate NSW system in Malaysia until 2014; after another contract renewal in 2009 (Choon, 2011). Single Window in Malaysia is designed to operate in electronics means in order to assist the clearance process between trade community and custom office at the border. This trade community consists of port operators, shipping agencies, forwarding agents and traders. Existing structure, National Single Window is consisting of five core services namely Electronic Declarations (e-Declare), Electronic Manifest (e-Manifest), Electronic Duty Payment (e-Payment) and Electronic Preferential Certificate of Origin (e-PCO) to covers basic cross boarding activities (UNNExT, 2010). Figure 1 shows simple diagram on information transaction process in national single window from the users to the respective authority. The submission process will be assisted by system moderator currently host by DagangNet Technologies Sdn Bhd that will act based on specific request on main five core services.

Single Window Malaysian Development

It is a systematic system to supersede unorganized conventional system where data and information for custom clearance are traditionally undergone scattered processed. The establishments of Single Window are adapted from the introduced by UNECE in their Recommendation 33, where 3 general models are developed, namely: Single Authority, Single Integrated Automated System and Single Interface Automated system (UN/CEFACT, 2005). Malaysia for a record was adapting a single interface System between agencies (G2G) as well as Business to Government (B2G) with an adoption of UNEDIFACT manages by Dagang Net Technologies Sdn Bhd (Butterly, 2003). It is considered as part of soft infrastructure in facilitating trade which giving an opportunity to the traders and the business to deal with government by one transaction only. The next process will be handled by the lead agencies or third party IT service where information will be segregated among the related government agencies via electronic means. Significantly, this process allows data and documents to be managed in an efficient way by reducing redundancy in data management and minimizing error (Grainger, 2010b). There are 2 categories of government agencies who directly involve with Single Window i) other government agencies who compiling trade data and information; ii) secondly, permit issuing agencies which responsible for the endorsement of permit for import and export (Parks, Finnin, Cullen, & McLellan, 2007). Transparency in customs clearance to the harp with the characteristics of transparency in the system because the information was presented to be shared by all government agencies so there is no element of favouritism or a 'private' partnership between actors that would encourage such unhealthy acts of corruption and bribery**.** An officer is no longer able to use the power of arbitrary while conducting their task (Apostolov, 2008).

The emergence of National Single Window in Malaysia was initiated from the adoption of trade facilitation measures developed by UNCEFACT purposely to facilitate the trade through effective management of information (UN/CEFACT, 2005). Thus, a committee has been set up lead by Ministry International Trade Industry that brought to the appointment of Dagang Net Technologies Sdn Bhd to serve as national IT service providers to develop a reliable framework for the operation of Single Window in Malaysia since mid 90's. Since then, Dagang Net has become the sole assessment service providers to design, develop, manage and operate the NSW system in Malaysia until 2014, after another contract renewal in 2009 (Choon, 2011).

A national Single Window milestone in Malaysia from the 80's when they started to adopt intranet to automate internal information system before it's improved with the use of automated system via Wide Area Network (WAN) to allow message exchange between organizations for custom for clearance process. In the Stage 3, government serious involvements towards the implementation of electronic message and data exchange between interest parties particularly for custom clearance and shipping declaration process. It is consistent with recommendation from international organizations such as the United Nation for European Union (UNECE) and World Trade Organization, which encourage for trade facilitation program for a betterment of the world trade process therefore they comes with fresh initiative to enhance the efficiencies and the effectiveness of the cross border trade process. Single Window in Malaysia is designed to operate in electronic means to assist the clearance process between trade community and custom office at the border. This trade community consists of port operators, shipping agencies, forwarding agents and traders. Existing structure, National Single Window is consisting of five core services namely;

Electronic declarations (e-Declare)
Launched in 2002, this web-based application allows importers and exporters to submit import and export declarations to the Customs securely via the Network. Today, it is available at all ports and entry points in Malaysia. The average number of Customs related a transaction conducted per month is 968,141 and the current number of users is 3,316.

Electronic Permit (e-Permit)
This paperless, web-based permit application system enables importers, exporters and forwarding agents to apply for import/export permits from Permit Issuing Agencies (PIAs). As of July 2010, e-Permit has gone live at 17 permit-issuing agencies and. About 284,655 permits were transacted in 2009 with each electronic cycle taking about less than a day and the number of e-Permit users have hit 10,714 users. The E - Permit is one of the cornerstones in the development of a true SW for electronic trade facilitation in Malaysia.

Electronic Manifest (e-Manifest)
It allows port users to submit cargo and vessel manifests to the respective authorities via the Internet. It allows 674 port users to send an average of 482,920 electronic CUSREPs, CUSCARs and Inter Terminal Transfer Document (ITT) each month directly to respective authorities through the Network

Electronic Duty Payment (e- Payment)
e-Payment is an online duty payment by way of electronic fund transfer service that enables preparation and submission of duty payment to Customs from agents or traders accounts. Duty categories including import and export duty, import sales tax, import excise duty and cess.

Electronic Preferential Certificate of Origin (E-PCO)
Implemented in January 2009, this Web-based Certificate of Origin application and approval system enables the environment for increased speed to market.

Methodology

Qualitative method

Case study is used to describe an intervention or phenomenon in real-life context, in which it occurred (Yin, 2009). The core strategy for this research is the individual experience of the subjects interviewed, represented through narrative analysis and interpretation to determine if a pattern or trend exists for further research efforts. The target audience was specific and focused to the group of users from private and public sectors unique to the national single window service in Malaysia particularly freight forwarders in the operational fields.

Units Analysis

Within the qualitative paradigm, research sampling size is not judgmental referring to the nature of this research which adopts the phenomenologist point of research. The sample selection may be small to be more focused and maintained the closeness to the situation and transform the pattern (Hussey & Hussey, 1997). This research adopts freight forwarders as the of unit analysis. Each participant was coming from different organization that contributes to a unique perspective of single window process with various background of experience in freight forwarding business. The percentage of respondents were selected according to purposive sampling. Purposive sampling allows researcher to examine a selected group of subject that hopes to be investigated (Singh, Fook, & Sidhu, 2006).

No	Organization status	Code	Designation	Years of Experience	Date of interview
1	Application Service Provider	P1	Advisor	21 years	January 2011
2	Royal Malaysian Customs	P2	Senior officer	10 years	March 2011
3	Royal Malaysian Customs	P3	Senior officer	12 years	March 2011
4	Freight Forwarder	P4	Operation	2 years	January 2011
5	Freight Forwarder	P5	Operation	9 years	January 2011
6	Freight Forwarder	P6	Operation	6 years	January 2011
7	Freight Forwarder	P7	Documentation and customer service officer	6.5 years	January 2011
8	Freight Forwarder	P8	Operation	4 years	January 2011
9	Freight Forwarder & shipping agencies	P9	Operation	3 years	January 2011
10	Freight Forwarder	P10	Operation	7 years	January 2011
11	Freight Forwarder & shipping agencies Freight forwarder	P11	Operation	3 years	January 2011
12	Freight Forwarder & shipping agencies	P12	Operation	19 years	January 2011
13	Freight forwarder	P13	Operation	8 years	January 2011
14	Kedai EDI	P14	Clerk	4 years	March 2011
15	Freight Forwarder	P15	Operation	8 years	May 2011
16	Freight Forwarder & shipping agencies	P16	Head of documentation and declaration	13 years	May 2011
17	Permit issuing agencies	P17	Head of division	9 years	September 2011
18	Permit issuing agencies	P18	Administrator	2 years	August 2011
19	Permit issuing agencies	P19	Manager	6 years	August 2011
20	Liner Operator	P20	Manager	8 years	August 2011
21	Port authority	P21	Senior manager	12 years	September 2011

Table 1: List of interview participants

As shown in Table 1, there were 21 participants selected from users in Klang Valley area with various lengths of experience in freight forwarding and shipping business. The majority of them who were still active came from Port Klang and Kuala Lumpur International Airport.

Data Collection

The main data collection method was in-depth and open-ended interviews, in which they were used to prepare interview guideline. Key informants provided supplementary data. The use of the interview guide indicated that there was some structure of the interviews, were treated as conversations during which the interviewer drew out detailed information and comments from the respondents. Average interview length is one hour for each participant.

Data Analysis

According to Glesne & Peshkin (1992), the data analysis in qualitative research deals with managing, filtering as well as selecting data using detail judgment and interpretation. It is spelled out using an entails process consist of sensing themes, constant comparison, recursiveness, inductive and/or deductive thinking and interpretation to generate meaning (Ruona, 2005). In this research, interview session voice data was properly recorded before the data were translated and filed according participants' unique code for easy references where pseudonyms were used to maintain its confidentiality. Hence, those data were those transcribing scripts were analyzed one by one to extract out the sensing themes that being discussed or mentioned by the participants.

Discussion

Single window is among trade facilitation measures which assist economic development and promotes logistics operational efficiency. Throughout the investigation, it showed that policy establishment, institutional cooperation, stakeholder awareness, electronic system reliability, training, ICT supporting facility, simplified procedure are the most significance factors of the effectiveness of national single window in Malaysia.

No	Factors	Elements
1	Policy establishment	• System ownership • Security • Internet Communication Technology (ICT) • Institutional Collaboration • Financial Facility • Data Harmonization • Investment Incentive
2	Institutional Cooperation	• Authority Collaboration • Data sharing • Trust
3	Stakeholder Awareness	• Publicity • Resistance to change • User knowledge • Information channel
4	Electronic System Reliability	• System ownership • Data security • Value added service • Administrative custom evaluation
5	Training	• Training availability • Training schedule • Training module • Electronic system literacy
6	ICT Supporting facility	• Mobilzed equipment • System investment • Telecommunication infrastructure • Financial facility
7	Simplified Procedure	• Process re-engineering • Timeliness • Trust accountability

• Data sharing

Table 2: Factors identified by freight forwarders

As shown in Table 2, there are 30 elements categorised under the seven factors that contributes to the effectiveness of national single window in Malaysia.

Policy establishment

The government policies were highlighted as one of the important factors to determine the direction of effective single window. The importance of policy towards the implementation of single window was also highlighted by Grainger (2008), where he argued that though a policy is highly required to support trade facilitation development but less effort is made on its execution considering the trade environment's complexity, many different, often conflicting, interests are at work. Luddy (2011) emphasizes that upon the initiation of a single window system, a few important elements are to be considered as a national principle for the generalization of system for the domestic and international connectivity. Those elements were highlighted as a pertinent aspect of comprehensive fundamental to effective single window which includes understanding the key legal issues, enabling laws and regulations, information sharing, data protection, privacy, organizational issues, liability, competition, electronic documents, intellectual property rights, data retention, electronic signature, cross-border authentication, and e-documents of title. This study revealed that the government policy on single window were developed from a few elements that require government attention, mostly in realigning the strategy for single window delivery to be practically acceptable by the community at large. First, the system ownership highlighted the important warrant about the governance of single window that leads to perceived contribution to the diffusion, followed by security coverage, ICT, collaboration among stakeholders, financial facility, data harmonization, and investment incentives.

Institutional cooperation

Institutions in single window consist of government agencies or appointed agencies to hold authorized power to be carried to control cross-border activities. There were three important elements that have been highlighted by the users to determine effective institutional support, namely authority collaboration, data sharing, and trust. A collaboration between authorities is important to ensure the smooth border governance is in place. Findings showed that the users were facing with the redundant information requirement by the related authorities for clearance arrangement. Therefore, the related institutions should support this collaboration by having mutual collaboration to support the single window initiatives. However, referring to the current situation, the participation stage is minimal to ensure the effectiveness of a single window.

Stakeholder awareness

Every stakeholder in the single window community was driven by the objective of their authorized responsibility or business commitment to be achieved. Four main cross-border agencies such as the customs were concerned about all cross-border trading undergoing possible screening and evaluation for duty and sales tax collection as well as their responsibilities were probably related to security and control purpose. For other government agencies, their responsibilities were in the border area to ensure the customs are given the best advice about particular products under their custody with respect to national or international law. In simple words, other government agencies were responsible for providing knowledge and expertise towards the extensive security compliance for a particular product to protect the national resources. Business people in a different set of agenda are concerned about their productivity to improve their operation and making more profits. Within the single window, multiperspective mindset was being united to produce a single window. Therefore, the very beginning of a single window formation involves multi-interests of every stakeholder. The 'individuality' assessment is no longer acceptable in the single window community to ensure the single window mission is effectively achieved.

Electronic system reliability

Another factor identified as a pertinent factor that contributes to effective single window is electronic system reliability. Reliability in the context of single window is the status of each information pledge to its recipient, where the single window will become the first to receive information that will establish system

acknowledgement by the users. This factor is closely associated with another four elements highlighted by participants, namely system ownership, data security, technical assistant, and administrative custom valuation that influence the effectiveness of single window implementation

Training

Training availability is an important element of training. It must be available first as an option for participation from the respective targeted participants. Availability here means expert training sessions are continuously offered to the interested groups whenever it is required. Training provision should be one of the obligatory missions in the single window governance to expose knowledge to the industry. The availability needs to be open to the public. According to the research data, training availability showed that the government was serious to encourage migration to total electronic single window community. It was a part of soft facility that should be provided to every single layer within the community. Once training is available, it will increase the users' confidence to get involved with the electronic community. It was found that reluctance to involve with a single window system that encourage users to 'do it yourself' option was due to the perception of the complexity of the system and the anxiety of making mistakes to a system that would create more complications. Findings from the interviews showed that there were two reasons why the training availability was very limited. First, a logistics officer from a small medium enterprise excuses himself to participate in the electronic system as the system is too difficult to understand and tedious. Due to his position as a documentation officer cum agent to the customs, he has limited time to undergo training. He is at the point of not knowing where to start in training since it is not published anywhere. A slight mistake would lead to a delay due to declaration problem. Hence, he would prefer to choose an alternative service using 'Kedai EDI' located at Port Klang. For that reason, he has not proposed to his top management about the system to avoid impediment towards his daily work. Second, in the context of freight forwarders, they also faced training difficulties as in the event of their effort to recruit more staff who were involved with the operational unit. They have to spend their time to conduct training to their new subordinates apart from their official duties. It was due to the difficulty to get training from the system expert. Training availability was shown as an important element when the new industry comers who possess limited knowledge of cross-border information transfer require single window intermediary. Single window users were from various industries and different academic backgrounds, from the laymen to the highest level of management. Therefore, it would be possible to have public training available for users, so they will plan accordingly to attend the training.

ICT Supporting facility

Single window in Malaysia was an attempt for a fully electronic supporting environment. In a country with a wide geographical position like Malaysia, the decision of an electronic option was considered as the best solution since it will be able to support a faster information transfer between the users and public agencies. Since 1993, SMK-DagangNet is known as a backbone of the NSW for customs declaration transaction even though has been there but more room for improvement. There were four important elements highlighting the ICT supporting facility as a factor that encourages the effectiveness of single window. The ICT supporting facility should be supported by the government for the respective community and also an initiative by the business community to seriously support an electronic environment.

Simplified Procedure

Scholars researching trade facilitation highlighted the importance of simplistic procedures that are able to be developed through the mutual understanding and cooperation between the stakeholders by putting business actors in a safer position (Grainger, 2007). Transformation of physical documents into the electronic set must associate with change of procedures at times (UNNExT, 2012). It was discovered that four elements to support the importance of simplified procedures in order to support the effective implementation of single window in Malaysia, particularly in the Klang Valley. The elements were process re-engineering, timeliness, trust accountability, and data sharing.

Conclusion

Obviously, single window effective delivery was driven by government policy and streamlines procedures by various agencies. Government policy should focus into data security, specific single window policy, agencies authority and promotion towards the system usage that must be clearly set up to build up users trust towards single window. Single Window procedures on multiple window issues, redundant working

approach, unnecessary procedures and paperless and paperless create a powerful influence towards the implementation that must be used carefully and systematically managed.

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NON-PHYSICAL BARRIERS FOR THE SOUTH EAST ASIA (ASEAN) MAINLAND CROSS BORDER RAIL FREIGHT MOVEMENTS: FACTORS THAT COULD AFFECT THE REGION'S SEAMLESS RAIL FREIGHT MOVEMENTS

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ASEAN Rail Performance

In this sub-region, the dependency of rail transportation, specifically the train, to carry freight is not obvious. Instead, the train could be said among the least use mode of transportation for carriage of freight crossing the international borders, in this sub-region. The less reliance of train to move freight crossing the international border in this sub-region is also influenced by the fact that there are a very limited number of facilities that enable the cross border rail freight movements to happen. As on 2014, there is only one border which the cross border freight trains services available in this sub-region, which is between Malaysia and Thailand through Padang Besar of Malaysia and Padang Besar of Thailand. There is another rail link connecting two neighbouring countries, which is between Thailand and Lao PDR, through the Friendship Bridge located between Nong Khai in Thailand and Vientiane in Lao PDR. The carriage of freight through this particular link would only commerce in 2015 (The Nation, 2013). As for the time being, the movements between Malaysia and Thailand will become the only active cross border rail freight movements in this sub-region.

In ASEAN, the train services are been made available by the local governments. Most of the service providers are either owned by the governments or controlled by the governments. Indirectly it means that the governments operate the trains' services in their respective countries. Kereta Api Tanah Melayu Berhad (KTMB) in Malaysia (Yeow, 2008), State Railway of Thailand (SRT) in Thailand (Devakula, 2008), Vietnam Railways in Vietnam (datviet, 2014) and Myanmar Railways in Myanmar (KPMG, 2013) are the sole train service provider in their respective countries, which are under the control of the government. They are also the sole service provider for rail freight in the countries. As for another two countries, Lao PDR and Singapore, the trains' services in their countries are and were operated by their neighbours. As for Lao PDR, SRT of Thailand provides the train services in the country. Meanwhile as for Singapore, the trains' services are and were operated by KTMB of Malaysia. For these two countries, the unavailability of railway facilities for freight trains limiting their opportunity to have their own state run railway companies. The situation in Cambodia is different from its neighbours. In Cambodia, the train services had been privatised in some area in the country (Hilton, 2012). Thus, two different companies run the operations of trains in Cambodia.

Under the managements of the local governments, most of the rail freight services in this region do not seems to performs very well. The table below shows the amounts of freight carried by ASEAN mainland countries, through rail freight services, for the past few years, as recorded by the World Bank:

	2010	2011	2012
Singapore	-	-	-
Malaysia	1384	1535	3071
Thailand	3161	2455	2455
Vietnam	3901	4101	3959
Lao PDR	-	-	-
Cambodia	-	-	-
Myanmar	-	-	-

Table 1: Goods carried by train (million ton-km) (World Banks, 2014)

Looking at the available data, Malaysia is the only country, which had increment in volume of freight carried. As for the other two countries, the numbers are not very encouraging. the data showed above only cover the freight carried in the countries. As for cross border rail freight movements, there is still yet to be available the data on the volume of freight carried.

Malaysia railway industry could be said as owning the most advance railway facilities in this sub-region. With the on-going constructions of double tracks and electrifying them, and also constructions of inland containers deport (ICD), it can be said that Malaysia is currently leading the developments of the railway facilities. Eventually, such developments of new facilities do not provide positive impacts on Malaysia rail freight performance. With the available facilities, KTMB is still facing losses and debt. Until 2014, current KTMB chairman, Ir. Nawawi Ahmad mentioned that they had earned 380 million Ringgit Malaysia, equivalent to about 118.07 million US Dollar. Eventually, such amount of profit would not be sufficient enough to cover the debt and losses they faced so far. For the same period of services, KTMB is facing the loss of 700 million Ringgit Malaysia, which equal to about 217.49 million USD (Bernama, 2014). Such losses are made available by the media to the public. KTMB Gemas Operation Executive, Basri Abu Bakar, mentioned about the financial losses faced by KTMB as follow: "In total, income for KTMB had been mentioned through media. KTMB had never gain profits. KTMB is facing loses every year."

The performance of Malaysian northern neighbour, Thailand, is not very encouraging either. Through the services provided by SRT, the company had yet to earn enough profit to enable them to cover the operation cost. According to Prasong Poonthanet, the director-general of the State Enterprise Policy Office, SRT was facing the debt of 7.58 billion baht, which is equivalent to about 0.23 billion USD (Chantanusornsiri, 2012). As on April 2014, according to Public Debt Management Office of Thailand, SRT is facing 113,484.970 million baht of debt (Public Debt Management Office, 2014). The company, which was founded as Royal State Railway of Siam in 1890, was reportedly bankrupt in the mid of 2000. From that incident, SRT required 60 billion baht to cover future losses and investment, on top of to cover the existing obligations of the company (Brixi and Schick (2002).

In Vietnam, the needs for railway facilities are overshadowed by the performance of other mode of transportations and its geographical landscape. As for the time being, the only international railway connection that it has is between Vietnam and China. The connectivity that Vietnam has with its region is fairly new. As far as the performance of its rail industry is concerned, according to Myint Thein, who is the Deputy Minister for Rail Transportation of Vietnam, Vietnam government is operating the railway industry at a loss. The government spend Ks 45 billion, which is nearly US$463,717 just to run the railway and maintain them in the country (Eleven, 2014).
"That's why our government is spending Ks 40 or Ks 45 billion yearly for the public. On the other hand, we are facing difficulties because the government has spent money for the upgrading of railroads and the renovation of coaches and locomotives (Myint Thein, 2014)."
Also, the railway transportation is among the seven sectors that had caused the nation to own the debt of Ks 900 billion, equivalent to 0.22 billion USD (Nyein Nyein, 2013).

The seamless movements suggested that the movements of rail freight could be made throughout the sub-region to maximise the capability and reliability of the rail freight services. As for now, the railway industry is moving inside the country, which limiting the possibility of generating the income for the country. By having the seamless journey, it could support the neighbouring countries in providing the services so that the demand and reliability of the rail freight could increase to the level where it could compete or even perform better than the other mode of transportations.

Institutional seamless journey
Uninterrupted journey will increase the value of rail freight services. The confidence level of the market is important to ensure the sustainability of the rail freight movements. In term of definition of seamless journey, it could be seen through three different perspectives namely linguistically, terminologically and conceptually. Macmillan had define the term seamless as below (2007):

1. Made without seams
2. Changing or continuing very smoothly and without stopping."

Terminologically, seamless carries the same meaning as coherent or uninterrupted. As for the seamless journey concept for cross border rail freight, deriving from the definition of seamless

linguistically and terminologically, it is a cross border journey from the point of origin until the point of destination without having to undergo any changes in between. Under this particular category, the seamless journey will exist if the shipments do not need to change legal documentations or formalities upon crossing the international borders. Documentations and information prepared at the place of origin will be use for the whole journey and border inspections are unnecessary. For the time being, the local government controls the regulations relating to cross border rail freight movements. There are a few ASEAN level declarations made concerning either freight movements or transportation, but the option of enforcing such regulations is within the hand of the members. Thus, as far as the regulations are concern, changes are necessaries for cross border rail freight movements. For the cross border movements that require going across a few countries, a lot of regulations from various countries need to abide to. For instance are the shipments between Thailand and Singapore back then. The regulations that need to be abide to consist of the combination of regulations from Thailand, Malaysia and Singapore. Even though the shipments just going through Malaysia, which were regarded as the transit process only by the Malaysian customs officers, still, the consignor and the carrier could not neglect on not to abide the regulations and prepared the legal documentations required by the authorities of the transit countries. Each institutional procedure will add more time on the shipments schedule.

There are a few ASEAN level declarations made concerning either freight movements or transportation. Declarations such as 1998 ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAFGIT), 2005 ASEAN Framework Agreement on Multimodal Transport (AFAMT) and 2009 ASEAN Framework Agreement on the Facilitation of Inter-State Transport (AFAFIT) are meant for the transportation of freight crossing the international borders. Eventually, the option of enforcing such declarations is within the hand of the members. Ratifications are not necessary mean that the members will apply such declaration. Thus, as far as the current individual regulations are concern, changes are necessaries for cross border rail freight movements. For the cross border movements that require crossing few countries, a lot of regulations from various countries need to abide to. These various procedures would result in non-seamless journey.

Non-physical barriers

“Anything that prevents progress or makes it difficult for someone to achieve something.” Linguistically, that is the meaning of barrier as been defined by MacMillan (2011). In order to have institutional seamlessness, the important things that need to be looked into are the institutional barriers, which are also known as the non-physical barriers. Theoretically, these barriers are the factors that hindering the seamless journey, institutionally. According to Regmi (2013), there are various barriers that could hinder the cross border movements generally. Among them are as such:

1. Inconsistent and time consuming, costly border crossing formalities and procedures.
2. Restriction/limitation on entry of vehicles.
3. Transhipment needed at the border.
4. Different standards of vehicles and drivers.
5. Restrictive visa requirement.
6. Difficult and different process for transit traffic.
7. Differential/reciprocal tariffs/charges.
8. Incompatible working hours at borders.
9. Coordination among various stakeholders.
10. Excessive security checks.

Looking at the list above, the institutional barriers had been highlighted in the form of formalities and regulations of the country in enabling the cross border movements. There are some of the institutional barriers mentioned above, which could not be avoided. But, for some of the others, by improvising the formalities available, the idea of seamless journey could be materialised.

Knowledge

The experience of this sub-region in handling the cross border rail freight movements is fairly new. With the experience of having a few cross border movements collectively throughout the history, it might be a very challenging situation in finding the best practice of cross border rail freight movements.

The knowledge under the scope of cross border rail freight movements could be looked into through a few ways namely through the knowledge of physical aspect of the movements and the knowledge over institutional aspects of the movements. As for the physical aspect of the movements, as for the time being, most of the technologies or facilities available in this sub-region are different from one country to another. David B. Hill had mentioned this particular situation by taking the example of Europe (2013):

"...cross border is a major issue in Europe because technology is different in the other side of the border…" (2013)
In this sub-region, Ruth Banomyong mentioning the same example over the differences that exist between neighbouring countries on the aspect of facilities:

"...Malaysia is electrified its rail system but Thailand, they still using diesel locomotive. So that means that you can't even cross the border. You stuck because you don't have any energy (2013)."
Such situation requires the knowledge of various parties in enabling the movements of train on the other side of the border. The knowledge in this context touches on the knowledge's own by the service providers. If the service providers have no knowledge of the facilities and condition of railway facilities at the other side of the border, it would be difficult for them to move the shipments seamlessly.

The factor of knowledge also touched on the procedures of movements on the other side of the border. As for the time being, the regulations applied are local based regulations. Thus, the formalities and formats are different from the other side of the border. Take a good example of customs procedures between Malaysia and Thailand. Both countries have their own set of rules regarding the international shipments. Although there are a lot of similarities between them, but the effect of non-similarity is more obvious, whereby it will hinder the seamless journey. For example is the aspect of documentations. Each country requires different set of documentations to enable to freight to be moved inside the country. With lack of knowledge available that could be used as the references to the stakeholders, seamless journey concept might be far from reach. On top of that, the standard of procedures between these countries are different, which make the customs of both countries difficult to work together uniformly.

Regulations
ASEAN is very well known for the working groups created by the members in dealing with various issues concerning the sub-region. In most occasions, the members will make a declaration in translating their efforts of working together for certain issues. AFAFGIT, AFAFIT and AFAMT are the good examples of declarations made between the members concerning the issue of transportations and logistics. Eventually, the enforcements of those declarations are in the hands of the members, which made the uniformity of regulations is yet to be materialised. The tendency of the members in this sub-region to use mutual agreed declarations is not high. Instead, when it comes to the transportation and logistics sector, the members tend to use their local regulations to assist the industry, even though there are declarations made on the said industry. The local regulations will weight on the need and necessary of the country. Protocol 6 of AFAFGIT, which touched on the Railways Border and Interchange Stations, had yet to be ratified by any of ASEAN members, as on 2012 (Foreign Affairs Division Office of the Permanent Secretary for Interior, 2012).

The differences in regulations could be witnessed through different branches of enforcements bodies. From the regulations perspective, the protection of service provider in the country is very obvious. In most of the members' countries, there could only be a single service provider for the freight trains services. Such situation created monopoly environment that hinder other service providers from operating inside those countries. Mentioning on this problem, Multimodal Freight Sdn. Bhd. Branch Manager, Rizat Rahim had gave an example of Malaysia and Thailand situation. According to him:

"As for now, even if Malaysia (KTMB) wants to enter into Thailand, there are already a lot bureaucracies involved. Malaysia Customs with their customs bureaucracies and Thailand with theirs. Once the train want to cross to Lao PDR from Thailand, there are other bureaucracies involved. And so on. If all the procedures are not standardised, how will the train reach Kunming?"
Talking on the railway law in Thailand, Ruth Banomyong mentioned as follow:

"Currently, the issue with Thailand is that the SRT has its own law and in its law basically says that train and locomotives need to be one operated by staff of SRT and the locomotives need to belongs to them."

Looking at the two members of ASEAN as the example, the restriction from the regulations on the service providers in those countries had indirectly hindering the possibility of other service providers to operate in the countries. Such condition will definitely hinder the seamless journey for cross border rail freight movements. As for the time being, the shipments between Malaysia and Thailand have to undergo changes of locomotives. Aliffin Abu, Padang Besar KTMB officer stated that:

"For the movements inside Malaysia, the Thais need to deal with KTMB and for the movements in Thailand, we need to deal with SRT."
The waiting time due to these procedures varies. It could be as early as a few minutes and it could be as long as days. Rizat Rahim explained that because of such regulations, sometimes the shipments faced a very long delay.

"Due to the problem with Thai locomotive, we reach here within a few days, but got stuck up to weeks. Thus, it creates problems for the shipment."
Opening the opportunities for other service providers, which could be done by the regulations control, to operate in the countries of members will make the intention of seamless journey more reachable. The problem of unavailability of locomotives could be solved with the improvising or alteration of regulations.

Commitment
In enabling the cross border rail freight movements to be seamless, commitments from various parties are necessary. It will complete the needs of the other stakeholders, which at the end will complete the chain of cross border rail freight movements. Below is the stakeholders' dependency diagram for logistics service as presented by Ruth Banomyong.

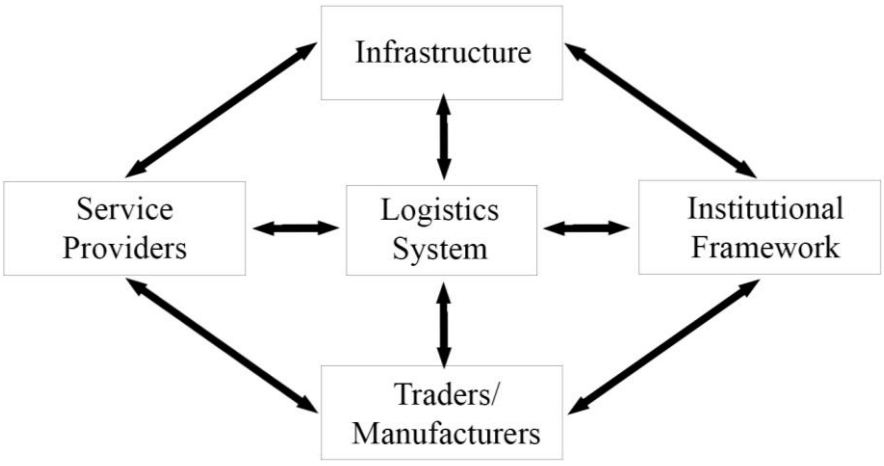

Figure 1: Macro Logistics System Framework (Banomyong, 2008)

Through the said diagram, it can be seen that every single stakeholders do rely on the other stakeholders in completing a shipment, especially the commitment from the country's government. The government of the country determines the shape and future of logistics industry using the regulations as the tool. The commitment of the governments could be seen through two different perspectives namely the commitments on shaping the future of rail industry and the commitments of preparing the ample preparation for the railway future.

The service of cross border rail freight movements between Malaysia and Singapore had taken place for quite some time. Eventually, it had been stopped in 2011 (Agence France-Presse, 2011). The service had ended due to the changed of ownership over the land which the train facilities located. The Singapore government had discontinued the rail freight services between these two neighbouring countries. This particular historical event is a good example on how the commitment of the members could influence the sustainability of rail industry in this region, which indirectly influences the possibility of seamless movements for rail freight. For Malaysia and Thailand, the limitation made by

the government on who could run the service in the countries had indirectly limiting the possibility of seamless journey. But for Singapore, the rail freight industry had been stopped upon the closure of KTMB facilities in Singapore. As in Malaysia, even tough there is suggestion made by Railwaymen's Union of Malaysia (RUM) to enable multiple service providers in Malaysia, but such idea is not been accepted very well. It shows that the government is still not committed to run the seamless rail freight movements.

Another commitment issue from the government is on the constructions of railway facilities. As on 2012, there are still some missing links on the railway connections between the countries. The table below shows the progress of developments of links connecting the ASEAN mainland members:

Country	Missing sections/ route & spur lines	Rail length (km)		Pre-feasibility (Pre-FS) or Feasibility Study (FS) status	Implementation status	Planned completion year
		Existing length of section	New construction			
Cambodia	Poipet (Thailand border) – Sisophon	-	28	Completed	Ongoing	2015
	Phnom Penh – LocNinh (Vietnam border)	32	254	Ongoing	Not commenced (under negotiation for funding)	2015
Vietnam	LocNinh (Cambodia border) – Ho Chi Minh City	20	129	FS Completed	Not commenced	2020
Thailand	Aranyaprathet – Klongluk	-	6	FS Completed	The budget for the rehabilitation had been allocated and is now in the process of bidding its contractor	2014
Lao PDR	Vientiane - Thakhek	-	330	FS Completed	Not commenced	2020
	Thakhek – Mu Gia (Vietnam border)	-	136	FS Completed	Not commenced	2020
Vietnam	Mu Gia (Lao PDR border) – Tan Ap	-	53	Pre-FS Completed	Not commenced	2020
	Tan Ap – VungAng	6	66	FS Ongoing	Not commenced	2020

Table 2: Current Status of SKRL Network Project (ASEAN, 2012)

With the absent of rail links, movements of trains could not take place. Thus, with the unavailability of rail links, there are concerns on the commitments made by the governments to complete such unavailability.

Finance

"If trillions of Vietnamese dong are invested in building roads only, they would be degraded in five or seven years because of overloading. However developing railways will help prevent money being wasted on constantly fixing roads or building new ones."

Above are the words by the Deputy Minister of Planning and Investment of Vietnam, Dang Huy Dong on the issue of how important the railway in the effort to improve Vietnam's economy. Deputy Transport Minister of Vietnam, Nguyen Ngoc Dong, mentioned that there is a need to improve the rail service due to the benefits that the transportation could provide for the transportation of goods, which will indirectly benefits the nation's economy. (Viet Nam News, 2014). With the absent of rail links, the constructions of new rail links are must to ensure the connectivity, which at the end might enable to enable them to construct the facilities on their own. Due to such economic problem, some of the members of this sub-region need to request financing from outside of the country to enable them to construct the facilities.

A good example would be the finance constraint faced by Lao PDR. For the country, which only had a few kilometres of railways, and with the majority of the citizens earn less than five US Dollar per day, constructing the railway facilities would become a major finance problem. Thus, to finance the project, the nation has to put itself in the position of long-term financial restraint. Lao PDR needs 7.2 billion US Dollar o develop the rail facilities in the nation. In materialising the project, they had to make loans from China to finance the constructions. The amount of loan made by Lao PDR is high and it is very risky to the country considering the fact that the country only has the gross domestic produce (GDP) of 8.3 billion US Dollar. Indirectly, the loan made by the country equals to about 86% of its GDP (Campbell, 2013). The deal made between Lao PDR and China was considered as the economics' transformations for the country. According to Ekaphone Phouthonesy, which is the deputy editor of the government-owned Vientiane Times:

"The business sector has also welcomed the development project as they believe cheap transportation will make cost of production low."
Such dream will stay put as where it is right now until the funding arrived for them to develop the rail industry (Campbell, 2013).

Conclusion
The idea of connecting this sub-region through rail is within this sub-region reach. The institutional seamless journey will bring more opportunities for the members, not only economically but also the opportunities to improve the local railway industry. But, the institutional barriers are more complicated to tackle as compared to physical barriers. Institutional seamless will eventually increased the reliability of rail freight industry in the future as most of the problems hindering the seamless movements originated from the institutional barriers.

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DEVELOPING PUBLIC-PRIVATE PARTNERSHIPS IN CHANGING BUSINESS ENVIRONMENT: EVIDENCE FROM THE DANISH AND FINNISH ENERGY SECTORS

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Introduction
Recent studies indicate that decision-making processes regarding public–private partnerships (hereafter PPPs) in service networks need further development from both practical and academic standpoints because of the variable outcomes of completed projects (see e.g. Royer and Simmons 2009; Vilko, 2012). In the public sector, labor-intensive functions have the most likely been externalized, because there has been considerable variation in their utilization (Rothery and Robertson 1995). However, record about PPPs in the public sector suggests that the best practices of the private sector have not been transferred in full-scale (Cordella and Willcocks 2009; Culpan 2009), thus it is not rare that public organizations have not managed to get the expected benefits from their network (Fernández and Kekäle 2007). In fact, less than one of ten organizations have achieved significant benefits from their PPPs (Lonsdale and Cox 1997; McIvor 2000). Moreover, only two large-scale deals of five were successful in the long term at least five years after the introduction, when success assessment has been implemented using objective criteria (cost savings, delivery vs. objectives and stakeholder satisfaction) (Cordella and Willcocks 2009).

PPPs in the developing business environment require rigorous analysis about the expected service offerings and technical features of delivered service. The externalization of services that have public domains is not a decision to use private partner or not, but rather what services and how for ensuring sustainable network development (Aubert et al. 1996; Raiborn, Butler and Massoud 2009). Developing new PPPs are argued to improve budgetary control of public administration, public value of use of services, and the initiative would lead to the emergence of totally new business branches (Bozeman 2009; Correlje and Groenewegen 2009).

Yet, little research about the impacts of PPPs has been published to challenge the practices of partner selection or methods of evaluating successfulness of developing a PPPs in service network (Harland et al. 2005). The partnering approaches typically do not take into account the fact that public sector strategies differ from those in the private sector (Jones 2009; Rahman and Corn 2009). Therefore, the purpose of this study is to analyze events in developing PPPs of two distribution network operators (hereafter ―DNOs") in Northern Europe. In doing this, we describe the decision-making processes and that have been employed to develop competitive service network in the maintenance and construction of electricity distribution networks. The process model outlines the steps to be taken in decisions concerned with learning, managing market risks and developing criteria for PPPs.

Theory
Public sector service provision
Public sector organizations are created to deliver service for the well-being of the people. For that purpose, authorities, local or domestic, are supposed to deliver public services to every citizen in precisely the same way, so that the basic principle is equality in front of the law and state (Cordella and Willcocks 2009). Therefore, the value creation logic of public service providers differs from private industrial corporations from which management theories are mainly derived. The private sector directs their interest to shareholder value which is ―private value" generated by the owner‘s interests (Matthews and Shulman 2005). However, public value, to which public sector provision targets, is related to the achievements of objectives set by government programs, the delivery of services to the citizenry, and the value of the use of public goods (Matthews and Shulman 2005; Vargo, Maglio and Akaka 2008). Thus, public value is not directly related to the efficiency of the operations, but rather contribution to the agendas of the public government (Matthews and Shulman 2005).

Despite the fact that public service provision should emphasize value delivered to clients, PPPs have proven to be driven mainly by concerns to lower costs or at least to decrease the deficit (Cordella and

Willcocks 2009). Another rationale for PPPs is the notion that private suppliers are able to achieve economies of scale and scope that are not available for a client (Walker, Knight and Harland 2006; Caldwell et al. 2005; Aschhoff and Sofka 2009). Still, public sourcing should be targeted to create few key suppliers that are competing, because in a fragmented market all suppliers might not be able to provide such benefits in the long term (Walker, Knight and Harland 2006). On the other hand, because of political belief that open competition will increase the efficiency of the public sector (Parker and Hartley 2003) and more or less appropriate use of private management doctrines, the public sector at present tends to pursue better economy, efficiency and effectiveness by a short-term cost-cutting approach (Errindge and Nondi 1994).

In the public sector network development, it is important to consider that the roles of the buyer, client and the supplier need to be clearly differentiated. Local authorities have to identify the characteristics of the provided services and to match those to the citizens‘ needs who are paying for the services directly or through taxation. One of the key points is translating the specific needs into technical specification to be included in contracts (Ancarani 2009). However, the development of service network is a complex interconnected multi-stakeholder system in which service providers, authorities and clients communicate with each other. The system on a general level is reported in Figure 1.

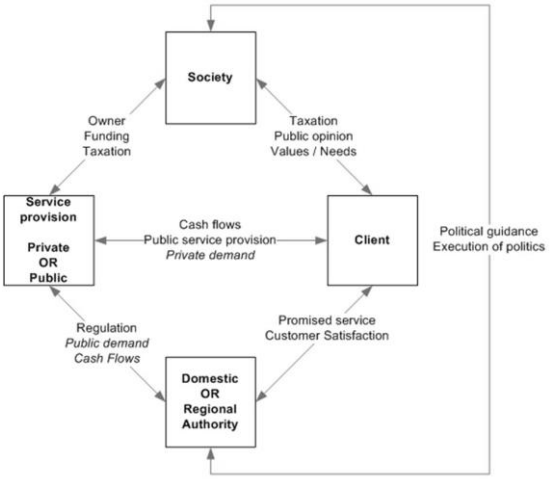

Figure 1 Roles and interactions of actors in public service provision (adapted from Walker, Knight and Harland 2006;Aschhoff and Sofka 2009;Ancarani 2009;Edler and Georghiou 2007)

From the aspect of this study, the two most important elements in the network are the interactions between the client and authority, and authority and service providers. Regulation projects the needs of a client creating signals for monopolies to develop product and service offerings toward society‘s expectations, which may change the premise of operations. In the future, public monopolies are expected to adopt a more service oriented way of operating. Thus, integrating the network offerings from multiple service providers becomes a focal operation principle (Vargo, Maglio and Akaka 2008; Janssen, Joha and Zuurmond 2009). Public organizations need to steer the network of resources in the new operation environment when they act as the core of the service provision (Vargo, Maglio and Akaka 2008). Managing such trends is a topical issue in European countries with many authorities, for instance, energy distribution, health care and data administration. However, mechanisms for the managing and developing such networks are still mostly obscure, and therefore the phenomenon needs further researched.

Public private partnerships

The actual increase of PPPs began at the end of 1990s (Cant and Jeynes, 1998; Morris and Imrie, 1992; Roodhooft and Warlop 1999). Market-like network systems are very effective mechanisms for coordination when the complexity of tasks and specificity of resources is low (Cordella and Willcocks 2009). Thus, externalization of service provision is likely to increase the efficiency of public authorities if activities are unambiguously defined and resources commonly procurable or markets are formed appropriately to support competition which leads to the creation of common systems. However, PPPs can take place despite the complexities regarding object function, if the market framework is simple and transparent enough for coordinating transactions (Jacobides and Hitt 2001; Jacobides and Hitt 2005; Jacobides and Billinger 2006). It is notable that as complex initiatives are, the important

establishing key supplier relationships are using long-term commitments for partnerships in mutual understanding (Caldwell et al. 2005; Goedert 2006).

Even acquiring services from uncompetitive or immature markets depends on abilities to formulate an effective governance framework which increases awareness of transacting methods. On the other hand, initiatives to create novel markets through PPPs have spill-over effects on the competitive dynamics of the supplying industry not depending on the scale of actions (Walker, Knight and Harland 2006; Jacobides 2005). Thus, a locally rational decision may be counter-productive when considered collectively. Decision-making can impact the size, structure and competitiveness of purchasing and supplying sectors (Walker, Knight and Harland 2006). PPPs have typically a rationale to utilize the supplier‘s ability to achieve economies of scale and scope that are not available for a client. However, locally managed outsourcing processes may lead to unsatisfactory results in two cases: (1) outsourcing decision creates a fragmented market of suppliers and is not able to provide such benefits in the long term, or, in the other extreme, (2) outsourcing without centralized control may create powerful players who gain power over the client sector (Walker, Knight and Harland 2006), which tends to restrict competition, increase the threat of opportunism and decrease the innovativeness of suppliers.

Moving all resources needed to perform an activity to partner tends to increase skill erosion, to reduce learning between partners, and to lead strong dependence and a lock-in situation (Uttley 1993; Kerr and Radford 1994; Patterson and Pinch 1995). To avoid undesirable influences of supplier dominance to public value, complete outsourcing is not the preferred form of cooperation in public service provision, although it is commonly applied practice. Therefore, selective sourcing in PPPs (i.e. retaining a minimal organization in-house) is suggested to maintain capability to design operation strategies, to define service provision systems, or to trouble-shoot unexpected problems which may influence public service delivery to citizens (Cordella and Willcocks 2009). From another perspective, orientation to strong customer dominance in emerging markets would also have harmful effects on competition, if the suppliers do not become active players to increase their performance and to take responsibility of their destiny (McHugh, Humphreys and McIvor 2003).

Developing public private partnerships
Evaluation of PPPs should rely on the notion that bureaucratic organizations have to be preserved as long as they provide better coordination than, for instance, market like organizations (Jacobides 2005). Thus, PPPs are possible if simplified coordination of an activity, standardized information and cost savings in every relationships are reached (Jacobides and Hitt 2005; Jacobides 2005). For successful development of public private service network, three main phases should be accomplished: Firstly, the assessment of the position and interrelations of activities within the organisation‘s portfolio (Moses and Åhlström 2008; McIvor 2000). Secondly, defining the right forms to manage supplier relations and building a transaction framework (Janssen, Joha and Zuurmond 2009; Janssen and Joha 2006), and finally, seeking out appropriate partners (Dubois, Hulthén and Pedersen 2004; Dubois and Pedersen 2002)

Research design
The basic insight in the energy industry is built on observations about the Finnish and Danish electricity distribution sector. The electricity system is traditionally divided into four sectors: generation, bulk transmission, distribution and consumption. Distribution has historically operated in a secured natural monopoly position where performance flaws have not been recognized. The paper contributes to management mechanisms of public–private partnerships in changing business environment which are opening through public sectors reform. In-depth interviews have been exploited to explore the influence of the business environment on decision-making in the DNOs. Detailed level of analysis enables exploring interactions between regulation and value network changes in the selected industry (Waltz 2007).

The action-oriented research approach was chosen for this case study (Pihlanto 1994) in which a pattern-matching logic was the mode of the case analysis. The target of the analysis is, thus, to compare empirically based patterns with a theoretically predicted one (Yin 2008). The selected approach allows investigating a phenomenon the boundaries of which cannot be clearly defined in the research context (Yin 2008). The action-oriented approach should not be confused with action research. In the latter case, the researcher is tightly involved in the process under study and aims at altering the behavior and inducing change (Baskerville and Pries-Heje 1999), whereas the action-

oriented approach is more objective and only explains the studied phenomena in a retrospective way (Pihlanto 1994). The researched process is presented in Figure 2.

Figure 2 Research process

The review of the decision-making process was implemented through written reports and a semi-structured interview with the two case firms. A total of ten interviews were conducted in Finland and Denmark (Table 1), which were transcribed for analysis. The interviewees represented owners, managing directors and the operative management of the firms. The written material was a collection of agreements, market analyses, due diligence reports and other documents concerning the case firms. Triangulation of evidence was conducted during the analysis process comparing the interviews with public documentary information (records on organization, financial information, and failure reports) about the case firm.

Position	Case	Organization	Involvement in decision making	Duration
Head of City Council	A	DNO	Yes	60 min
CEO	A	DNO	Yes	130 min
CEO*	A	DNO	No	45 min
CFO	A	DNO	Yes	70 min
Division‘s Director	A	Service provider	Yes	43min
Development Director	A	Service provider	Yes	35 min
Division‘s Director*	B	Service provider	No	79 min
CEO	B	Service provider	Yes	51 min
CEO	B	DNO	Yes	91 min
CEO*	B	Service provider	No	46 min
* Recruited after outsourcing decision				

Table 1 Profile of the interviews Case A and Case B

Analysis and Results

Overview of the industry context and the cases

Practically all failures in the networks immediately affect the electricity supply of numerous customers. Indeed, DNOs have historically operated in secured natural monopolies. Until the present time, monopolies have not faced competition and, thus, have been willing to make only incremental, if any, adaptations to their operations and offerings to improve their correspondence to prevailing customer needs. However, network structures have recently began to change, when management has faced pressures to improve efficiency by regulation.

National sector-specific regulators are often assigned with the task to supervise that neither the distribution charges are unreasonable nor the monopoly positions are misused. Some EU Member States have a long history of formal regulation of the electricity supply sector, whereas others have just quite recently started sector-specific regulation. At present, there are still differences between countries regarding the level of sophistication of the applied methods of economic regulation. In Denmark, the conflict has led to a time-out in regulation, which enabled the regulator to produce a regulatory model on which both sides can agree. In Finland, regulation has been more straightforward

in introducing incentives. However, the development pattern of economic regulation has been similar in most of the EU Member States.

Industry deregulation has not been the only driver for restructuring. Despite the public domain of the provided service, the value potential of ownership was first realized when industrial owners conveyed their interest toward the shares of DNOs. The bids for the shares then steered management to optimize the productivity of the DNOs for a higher procurement value by the insistence of the public owners. Finally, the new industrial owners changed the organization structure and culture by demanding higher profitability and returns for the investments. Thus, rationalization programs were launched during the first regulatory period leading to outsourcing of supportive activities. The trend was reinforced by the performance regulation by the states which, on the one hand, sets limits for acceptable returns and, on the other hand, forces DNOs to improve overall productivity.

The timing of the cases differs when compared to the life cycle of the service industry. Case A was implemented at the early phases of the markets, whereas Case B was timed at the phase of growth. The different time frame of the cases is reflected in the decision-making processes within the studied DNOs. Case A has a rather strong emphasis on determination of appropriate service offering, whereas the efficiency of technical alliance formation was the priority in Case B. Indeed, due to public ownership of the DNOs, local politics had a remarkable role when decisions to use partners in the selected activities were formed in both cases. Overall, business management had realistic insight into latent inefficiencies, but owners reacted in the situation as a result of major changes in domestic policy and regulation.

Case A – A Finnish DNO

In Finland, the period of unregulated monopolies lasted until 1995, when the Energy Market Authority (EMA) was founded to supervise the DNOs. This was the beginning of a series of competitive changes in the electricity distribution sector, which had historically operated in stable market conditions. The first stage of regulation covering the years 1995–2005 focused on reasonable pricing, and it was based on actual costs and case-by-case investigation of network companies. The first decisions on reasonable prices were made in 1999. The next development in the regulatory model was the introduction of efficiency benchmarking in 2001, and in 2003, standard compensations were introduced for interruptions lasting 12 hours or more. The changes in regulation in 1995, 2001, and 2003 have stimulated the Finnish DNOs to purchase supporting operations, which can be seen as an increase in outsourcing take-offs especially in 1995 and at the beginning of the 2000s.

The case in this study is an average-size Finnish network company, primarily owned by local communities. An industrial owner initially had a minority owenership in the company, but became a majority shareholder in 2002. The time frame of the case is set to the years 1999–2002, when changes in the political climate and the business environment took place. In practice, minimizing outages in electricity supply became a critical issue after the amendment of the Finnish Electricity Market Act in 2003. The preparation process to enable outsourcing (Figure 3) was carried out in two parts in Case A: (1) the company was split up and (2) a market interface was determined through a learning process with the service provider, which in this case was the daughter company. The target of the division process was to determine the total costs of maintenance and construction in Case A, and to set limits for market prices. The focus was on determining the feasibility of the market governance framework and on finding possible problems in purchasing. The overall impression from Case A was that actions were well planned and the market creation process was analytical. The results of the learning process with the daughter company provided valuable information for business management, and Case A had quite a good insight into the operational environment of the outsourced function even though the markets were immature.

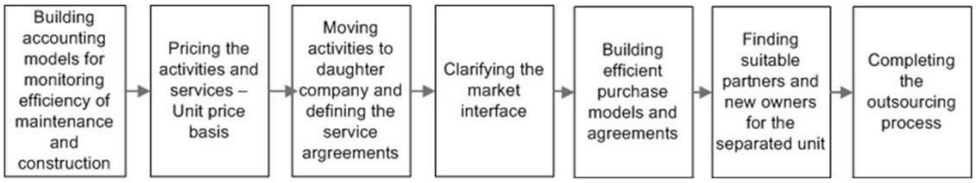

Figure 3 Partnership formation process in Case A

Case B – A Danish DNO

The Danish electricity markets were opened in 2000, which is relatively late, when compared with other Nordic countries. At that time, the regulation of electricity distribution business was also launched and the Danish Energy Regulatory Authority (DERA) was established. The regulatory process encountered difficulties similar to other Nordic countries in the early days of regulation. In the first regulation period of 2000–2003, the revenue cap regime was in force. It was planned to involve a four-year review period and a four-year regulation period, but the regulation period was shortened owing to problems in the regulation. The revenue caps were determined based on historical expenses. Deviations from the revenue cap in terms of over- or undercompensation would be accounted for in the later regulation periods. The efficiency requirement consisted of the general efficiency requirement set by the Ministry and a company-specific requirement determined by a benchmarking model. The efficiency improvements were to be reached in a single year, and that made the Danish approach seem demanding in comparison with its international counterparts. However, the exact company-specific efficiency requirements were determined in negotiations with the industry, and the revenue caps did not impose immediate catch-up.

The process of outsourcing began from monitoring efficiency in Case B (Figure 4) because of obvious performance gaps regarding network maintenance and construction. To improve cost control, the functions were separated to a shared service unit. Despite founding the service center, all issues regarding monitoring financial performance could not be solved, because corporate level overhead costs were partially mixed with those of service units. The maintenance and construction service unit was later moved into a newly founded daughter company that took care of almost all of the construction and maintenance in the Case B firm. The structural arrangements of corporation changed the cost structure significantly more transparent, allowing new options to address existing performance issues. The actions taken to improve the performance of the daughter company were a study about the company structure and the most valuable functions. The analysis determined the problem to which the rationalizing program was targeted. Moreover, the rationalizing program contributed to valuing of the daughter company, which gave an excellent starting point to the negotiations with prospective private owners. At the final phase, the case was accomplished by selling the service company to an industrial owner. The selling basically followed the normal procedure in the municipal sector – it was arranged as an open bidding competition.

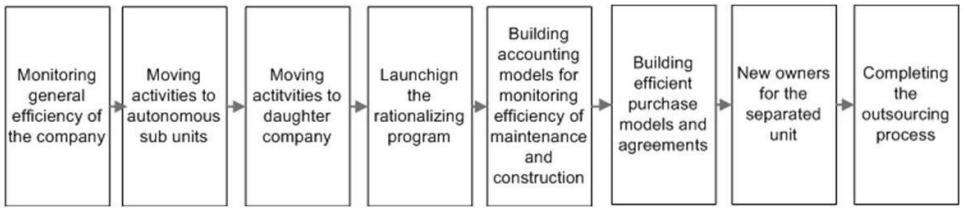

Figure 4 Partnership formation process in Case B

Discussions and conclusions

In this paper, we analysed the network development process in the case of two public private partnerships. The study has several contributions in pointing out the special features that should be considered in the network development process of public service provision. The analysed cases share similarities in terms of process implementation, however, the expected outcomes for the cases were quite different. The actions taken in Case A had targeted to determine the feasible governance framework for supporting activities through market governance, and to foster the emergence of competitive markets, which are able to provide gains for DNOs through competitive rivalry. Case B was more straightforward and the development of the market governance framework did not appear to be a major goal. Most of the actions aimed to solve efficiency problems during the learning process in which acquisition was a solution for performance improvements.

Overall, the process for outsourcing was rather similar in both cases and it supports the theoretically predicted one. The process can be considered to consist of three parts: (1) partitioning the company, (2) determining the market interface through a learning process with the shared service unit, and (3) preparing partnerships with an external service provider. At the first phase, the main objective is changing a function to an independent cost object in the accounting system to increase awareness about performance. The second phase aims to increase understanding about the benefits and issues that are likely when cooperating with external partners. Practically, moving a function to an

independent department and later to the daughter company has been recognized as an effective procedure. Both cases indicate that the performance of the service unit or company is partially dependent on the culture driven by the owner. Thus, outsourcing a function using a joint venture, alliances or complete outsourcing is recommended, because they provide expedients for more fundamental changes in the operations culture.

The two cases differ from each other especially at the level of learning results. The actions taken at the preparation phase had well-defined targets in Case A. The daughter company had efficiently aimed to deliver information about the functionality of the market governance framework and to reveal probable problems in supplier relationships in the long term. The objective was to build a management process for purchasing and learning from an external service provider. The applied process provides rather good insights into the operational environment of an outsourced function which reduces the risks of outsourcing to a sufficient level.

The case analysis confirms some of the results of the earlier studies (see e.g. Jacobides, 2005) indicates that two necessary conditions for market emergence exist to which the outsourcing process should be targeted: (1) efficient coordination and transparency of operations and (2) a governance framework that provides reliable and standardized information for comparing the service providers. The first condition was valid in both cases, but the steps taken toward the required state were better planned in Case A.

The study has obvious limitations due to its case research design. Further research is needed to develop explicit methods for analyzing the impact of industry evolution to the performance of firms.

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A SIMULATION MODEL APPLICATION FOR CHIANG MAI UNIVERSITY MASS TRANSPORTATION SERVICE IMPROVEMENTS

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Introduction
Chiang Mai University (CMU), was founded in January 1964, being the first provincial institution of higher education in Thailand. CMU has confronted with a transportation problem such as air and noise pollution, energy costs, parking lots, etc. Thus, a CMU mass transport service project was established to solve the CMU transportation problem by operating electric-powered vehicles.

However, this project does not achieve expected results, including with unpunctuality, insufficiency of vehicles, inaccessibility of routes and unsatisfied services (Tsuda, 2003). Vehicle fleet routing and timetable setting are the fundamental focus of the transportation service system because they play an important role for increasing level of satisfaction. Moreover, the passenger trip demands, the operating constraints, the operating costs, maintenance and crew scheduling, have been considered in the transportation system (Yan and Chen, 2002).

The transportation problem is one of the planning problems with stochastic disturbances. Yan *et al* (2006) applied a simulation technique to solve the projected and actual daily passenger demand problem or stochastic disturbances. Simulation modelling is a common paradigm to experiment with the complex system such as improved system design, cost-benefit analysis, sensitivity to design parameters and so on (Altiok and Melamed (2010).

The purposes of this research are to analyze a problem of a mass transport service system in Chiang Mai University and propose efficient approaches for improving the logistics system. The rest of this research is organized as follows: In Section 2, related literatures are reviewed. In Section 3, a method for modeling the simulation is proposed. In Section 4, numerical tests are executed to discuss the performance of the models and to compare with proposed approaches. Finally, conclusions are offered in Section 5.

Literature Review
Transportation problems and their solution techniques have made big issues in logistics and supply chain management for reducing cost, improving service quality, etc (Cetin and Tiryaki, 2014). The general transportation problem is focused on any commodity distribution from any group of supply centres called sources to any group of receiving centres called destinations (Chaudhuri and De, 2009). Laporte (1992) advocated that the vehicle routing problem (VRP) plays a significant role in the fields of physical distribution and logistics. This problem could be solved by using not only exact algorithms but also heuristics algorithms. Wang and Lang (2008) combined a tabu search algorithm with a new solution indicating method to give a short computation time and stable results. Nevertheless, in last decade, simulation has also been a promising tool for solving the VRP. A mathematics simulation model was developed to minimize cost in the logistics processes of the radiopharmaceutical products (Kaewmam, 2011).

Tsuda (2003) investigated the inefficiency of the CMU mass transportation project. It was also found that the expectation was set at high level, but the satisfaction level was evaluated at the low level. Therefore, it is necessary to improve a CMU mass transport service project by applying the simulation technique for dealing with a complicated problem.

Research Methodology
CMU mass transport service problem was analyzed and evaluated via simulation study for reforming quality of services. The model was kept as simple as possible to keep away from any noise that affects the results. The simulated model was developed using the simulation commercial software ARENA 14.0. Numerical data were obtained by using time study sheets which comprised of an electric-powered vehicle duration form, a take on and off passenger data form. All statistical distributions were analyzed by goodness of fit tests (the Kolmogorov-Smirnov test or the chi-square test). Verification and validation techniques were tested to accredit the simulation model.

The Input Analyzer was used on observed historical data for estimating a probability distribution and parameters. An error-free computer program or debugging the model has been used which is called verification. This study employed a structured walkthrough technique to verify the model. The simulated results were compared with existing systems output data to determine event validity (Law, 2008). Internal validity was exploited to convince the model from the amount of stochastic variability (Sargent, 2008).

The ARENA was run at approximate replications to achieve a confidence interval with a pre-specific desired half width for forming outputs of lead time and delivery reliability as follows:

$$n \cong n_{\circ} \times \left(\frac{h_{\circ}^{2}}{h^{2}} \right) \quad (1)$$

where $n_{\circ}$ is the number of initial replications and $h_{\circ}$ is the half width from initial replications, h is a pre-specified desired half width.

Finally, the accredited model was analyzed and compared with proposed alternatives for observing results.

Results and Discussion

This section discussed the results of the simulation study for the CMU mass transport service problem. The study was performed on a computer with an Intel® Core™2 Duo CPU P8700 running at 2.53 GHz with 4 GB of RAM. Ten independent replications were set to observe the model. Each replication was terminated in one-hundred-twenty minutes. Common random numbers were adopted to diminish the variance across experiments.

An overview of the simulated design

A procedure of CMU mass transport service system was developed by mimicking current transportation operations as shown in Figure 1. On one hand, the stochastic passenger trip demand triggered the transport system. Each passenger goes to electric-powered vehicle stations and then waits for the restricted thirteen-seat vehicle. On the other hand, a planned schedule is typically set based upon experience. Scheduler drafts a timetable by utilizing the trial-and-error process for vehicle routing and scheduling practices. Sometimes, this timetable is adjusted with possible revisions. This process is iterated manually until a desirable timetable is obtained.

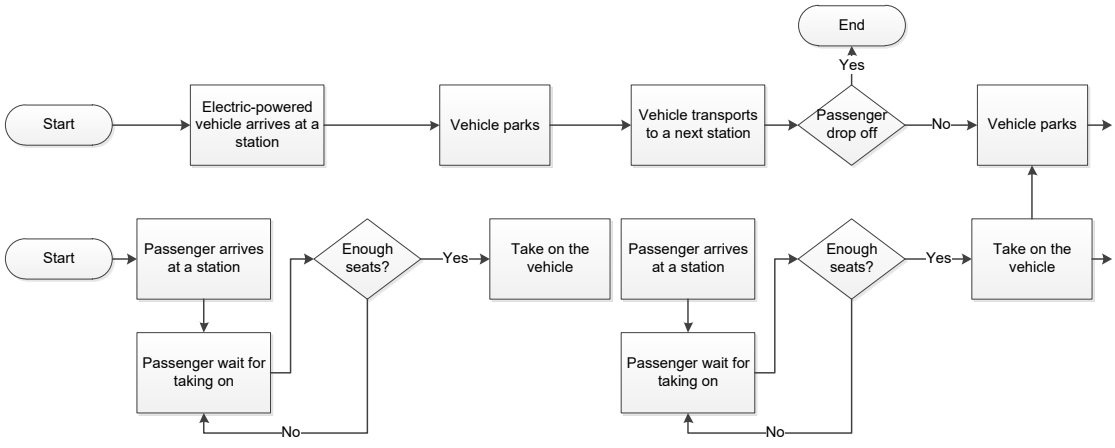


Figure 1: An overview of the mass transport service system in Chiang Mai University

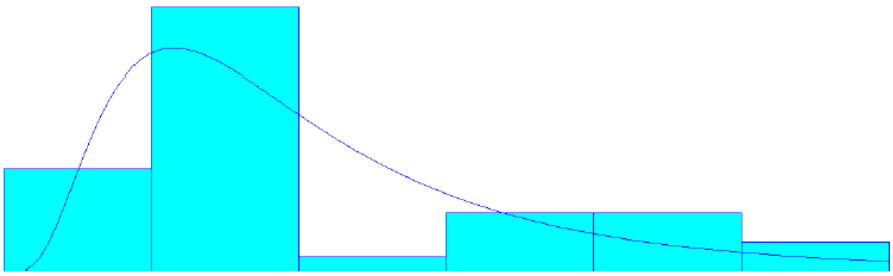
Besides, the simulation model was built by using assumptions as follows:

- Route number one with service on specific time from 8:00 a.m. to 10:00 a.m. was selected as a case study. Hence, the simulation run length was started from 0.00 minute to finish at 120.00 minutes for each replication. Moreover, the first entity was generated at 0.00 minute and maximum number of arrivals was placed at infinity.

- All passengers were sequentially (on a first come, first served basis) assigned the same priority. Electric-powered vehicles could be continuously operated for serving passengers. Failure condition was unconsidered in this model.
- Simulated transportation average cost was set at 1 unit per minute.
- Level of service satisfaction was measured by considering passenger waiting time.

Verification and validation

Numerical experiments usd a historical data set of time study sheets. Statistical distributions from the Input Analyzer were tested by using goodness-of-fit tests. The Input Analyzer displayed a histogram of the electric-powered vehicle departure from the first station as shown in Figure 2. It formed a lognormal distribution (corresponding p-value > 0.15). The basic characteristics of the simulation model are listed in Table 1.



Shop	CMU Front Gate Station
Distribution	Lognormal
Expression	LOGN(0.603, 0.445)
Priority dispatching rule	FIFO
Time unit	Minute
P-Value	>0.15

Figure 2: Statistical distribution of the electric-powered vehicle

Number of stations:	Thirty-seven stations
The electric-powered vehicle departure:	Lognormal distribution (0.603, 0.445)
Passenger-arrival times:	Beta, Exponential or Weibull distribution
Priority queue:	First come, first served basis
Time unit:	Minute

Table 1: Summary of simulated model characteristics

It was found that Health Centre station, Agriculture passenger hall station, Faculty of Business Administration station, Cooperative Store passenger hall station and Faculty of Social Sciences station were high probability drop-off stations.

The model was verified by implementing a structured walkthrough technique. Event validity was made by equating simulation results to actual results. The simulation outputs report is stated in Figure 3. A comparative experiment was analyzed using confidence interval procedure for comparing results as exhibited in Table 2. Thus, it appeared that the model was reasonably valid.

Generally, the simulation report generates a column called “half width of 95% confidence intervals”, which determines the reliability of the simulated results. However, the half maximum width of this experiment was 2.05 minutes.

Replications: 10 Time Units: Minutes

User Specified

Tally

Interval	Average	Half Width	Minimum Average	Maximum Average	Minimum Value	Maximum Value
Duration at Acc ba	61.5469	0.93	59.5815	63.5733	17.0000	120.00
Duration at Augkaew	64.7002	0.77	63.0047	66.0324	31.0000	119.99
Duration at Building4 of Education	62.1330	0.86	60.7017	63.8620	21.0000	119.99
Duration at Canteen of Education	62.4479	0.83	61.1284	64.0318	21.0000	119.99
Duration at CMU Food Court	56.0268	1.29	52.2674	58.2893	4.0000	119.92
Duration at CMU Front Gate Station	65.2203	0.66	63.7238	66.5620	34.0000	119.94
Duration at Department of Education	62.2513	0.88	60.5979	63.7930	20.0000	119.96
Duration at Dorm 40	62.0580	1.34	58.9416	65.0622	9.0000	119.94
Duration at Dorm G2	59.0864	1.07	56.5019	61.2346	5.0000	119.92
Duration at Dorm G4	61.0609	1.04	59.3252	63.7316	12.0000	119.91
Duration at Dorm G5	61.2815	1.06	59.3055	64.1389	12.0000	119.91
Duration at Dorm G6	61.3480	0.82	59.8871	63.5213	14.0000	119.84
Duration at Dorm G8	61.5601	1.55	58.6806	65.1536	11.0000	119.98
Duration at Dorm Pink	61.0648	1.23	57.4504	63.1962	7.0000	119.94

Figure 3: User specified simulated results

Station	Actual	Simulation
CMU food court	4.19-6.14	4.00
Women second dormitory	4.52-6.47	5.00
Pink dormitory	5.58-8.22	7.00
Forty-year anniversary dormitory	6.53-9.17	9.00
Women eighth dormitory	9.17-12.46	11.00
Women fifth dormitory	9.49-13.44	12.00
Women fourth dormitory	10.16-14.11	12.00
Women sixth dormitory	11.05-15.00	14.00
Faculty of Business Administration	16.45-20.42	17.00
Department of Home Economics, Faculty of Education	18.53-21.50	20.00
Canteen of Faculty of Education	19.06-22.03	21.00
Fourth building of Faculty of Education	20.42-24.44	21.00

Table 2: Partial results of a comparative experiment

However, the variance should be lower than one minute by referencing to corresponding officer's suggestions. From Equation one, a number of replications might be adjusted instead of ten replications to $n \cong 10 \times \left(\frac{2.05^2}{1.00^2} \right) \cong 42$ replications. Additionally, several replications of the simulation model were developed to obtain a satisfactory internal valid model.

Results comparison

Existing-simulated results were compared with proposed alternative systems to improve CMU mass transport service. Comparative experiments comprised of transportation average cost and passenger waiting time. These alternative approaches are:

- Increase five percent of electric-powered vehicle quantities.
- Operate an express route for stopping at high probability drop-off stations by using existing electric-powered vehicles.

As the results, transportation average cost and passenger waiting time are compared in Tables 3 and 4, respectively.

The first alternative increased cost 7.36% and reduced insignificant waiting times. The second alternative made an impact for decreasing waiting times in five specified stations. The other stations increased a little waiting time

Comparative issue	Existing	Alternative 1	Diff.	Alternative 2	Diff.
Transportation average cost	54.4524	62.0714	+7.36%	54.4524	-

Table 3: Comparative results of transportation average cost

Station	Existing	Alternative 1	Alternative 2
Division of General Affairs Office	0.4725	0.4522	0.8016
Faculty of Political Science and Public Administration	0.4785	0.4498	0.8012
CMU food court	0.5251	0.4943	0.8415
Women second dormitory	0.5624	0.5324	0.8780
Tennis court	0.6044	0.5719	0.9161
Pink dormitory	0.6619	0.6367	0.9646
Forty-year anniversary dormitory	0.7963	0.7633	1.1051
Pink dormitory (circulate route)	0.8691	0.8630	1.1829
Health Centre	0.9313	0.9151	0.6546
Women eighth dormitory	0.9486	0.9234	1.2517
Women fifth dormitory	1.0316	1.0328	1.3454
Women fourth dormitory	1.0345	1.0218	1.3390
Women sixth dormitory	1.2683	1.2184	1.5659
Swimming pool	1.2639	1.2361	1.5681
Main stadium	1.2587	1.2432	1.5698
Agriculture passenger hall	1.5275	1.4582	0.9706
Faculty of Business Administration	1.6317	1.6245	1.0355
Softball area passenger hall	1.9250	1.8884	2.2227
Department of Home Economics, Faculty of Education	2.0716	2.0698	2.3369
Canteen of Faculty of Education	2.2761	2.2732	2.5586
Fourth building of Faculty of Education	2.1977	2.2065	2.5400
Canteen parking lots of Faculty of Education	2.4363	2.3987	2.7065
Faculty of Engineering	2.7662	2.8176	3.1115
Faculty of Architecture	3.2531	3.2748	3.5683
Men first dormitory passenger hall	3.4556	3.4691	3.7079
College of Arts, Media and Technology passenger hall	3.7419	3.6479	3.9841
Cooperative store passenger hall	3.8737	3.8068	2.5903
Faculty of Social Sciences	3.9450	4.0000	2.5810
Social Science building passenger hall	4.1610	4.1925	4.3436
Ang-kaew	4.4398	4.3411	4.7935
Information Technology Service Centre passenger hall	4.6501	4.6768	4.9329
Sala dharm	4.7054	4.6669	4.8500
Rugby area	4.9100	4.9780	5.2752

Table 4: Comparative results of passenger waiting time

Conclusions

From the case study, experimental results indicated that this model nearly behaved the same as a real system. The simulated-prototype could be applied to design the case study. The assessment results showed that alternative two performed better than alternative one and the existing one.

The case study had some gaps to bridge such as an appropriate route, a number of available electric-powered vehicles, considering average operating speed and the turn-around time at the station, the related cost/revenue of electric-powered vehicle movements and the quality improvement of service to attract more people. The validated simulation model gives transportation planners to test various mass transport service scenario solutions involving the use of intelligent transportation systems prior to their implementation.

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MULTIMODAL AND INTERMODAL FREIGHT TRANSPORTATION: A REVIEW

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ABSTRACT

Purpose: Generally, multimodal and intermodal have been widely used and being classified as the same definition. The purpose of this study is to have the comparative review between intermodal and multimodal terms whether these terms are carrying the same or totally different definitions to be used by researchers and industrial practitioners.

Design/methodology/approach: The methodology of this study was carried out by reviewing literature on multimodal and intermodal freight transportation in supply chain.

Findings: Multimodal involves international transportation for example ship by the use of container or cargo under a single contract. Meanwhile intermodal usually consists of intermodal terminals during the process. There is no right or wrong terms but depends to the researcher whether to use the term generally or specifically because both give the same definition of combination of two modes of freight transportations.

Research limitations/implications: This paper focuses to freight transportation only and do not discuss on passenger transportation.

Originality/value: This study will provide basic guideline for researchers for both definitions to steer clear of confusion for future reference.

Keywords: Multimodal, intermodal, freight transportation, supply chain

Introduction

Economic globalisation requires firms to produce and deliver goods faster to customers around the world by managing supply chains and integrate logistics systems efficiently (Rondinelli and Berry, 2000). The operation of transportation will determine the efficiency of moving products. The progress in techniques and management principle improves the moving load, delivery speed, service quality, operation costs, the usage of facilities and energy saving. Transportation is one of the most essential components in business as through which raw material are procured by manufacturers and end products delivered to customers (Nazery, 2006) (John *et. al*., 2009). Therefore, transportation represents the biggest portion of company's logistics cost, taking up to 40% to 60% of such costs which included warehousing and inventory carrying charges (Murphy, 1998). The estimation for transportation expenditure could reach between 2% to 5% of the cost sale (Soriano, 2001). Many transportation systems are multimodal (Bektas and Crainic, 2007). A great logistics strategy cannot bring its ability into full play without the efficient transportation system (Tseng *et. al*., 2007). The present transportation system lacks coordination of different modes of transport, thus wasting the resources and decreasing the efficiency (Qingyun, 2007). Meanwhile in developing countries, transportation is the important ingredient of sustainable development. More integrated and more efficient transportation system should be remained and should create for better future planning in trends ahead (Crainic and Laporte, 1997).

Freight Transportation

Freight transportation demand in Europe has been mounting by more than 30% during the last decade (Arnold *et. al*., 2004). Freight transportation is not only measured by the standard of its own share of a nation's gross national product (GNP), but also by the increasing influence that the transportation and distribution of goods have on the performance of virtually to all other economic sector (Crainic *et. al.,* 1997). The freight transportation can be divided to four main transportation modes which are air, water, rail and road (Rondinelli *et. al*., 2000). Factors that influenced in choosing the mode of transportation are the capacity shortages, international growth, economies of scale and scope, security concerns and environmental and energy used concerns (Mary and Mario, 2008).

Multimodal/ Intermodal Transportation

Intermodal transportation service and multimodal transportation infrastructure play a vital role in the logistics system for competing in global market in 21st century. As the demand for intermodal logistics services and multimodal transportation facilities grow, a seamless transportation becomes more central to integrated logistics. Multimodal transportation infrastructure adds value in logistics as integrated system (Rondinelli, *et. al*., 2000). Meanwhile other researchers agreed that multimodal container transportation is playing an increasingly important role in global supply chains and trade. (Vilko and Hallikas, 2011).

Intermodal transportation is characterised by the combination of rail and road, rail for long distances and large quantities, road for collecting and distributing over short or medium distances (Nierat, 1992) (Slack, 2001). Intermodal (or combined) transport can be a worthwhile alternative to unimodal transport especially for road transport. The main part of the journey is done by rail, inland waterway or sea, and any initial and/or final legs carried out by road as short as possible. The location of the terminals where a change of mode takes place matters in the evaluation of economic competitiveness but also in the success of multimodality (Arnold *et. al.,* 2004). Figure 1 shows the example of intermodal networks. Figure 1 shows that intermodal transfer facility is modelled as point (a "hub) and geoprocessing script is run to generate "spoke" from that hub to the nearest transportation network elements for those modes that the hub serves (for example a railyard would connect the rail network with the highway network) (Swayne *et. al*., 2012).

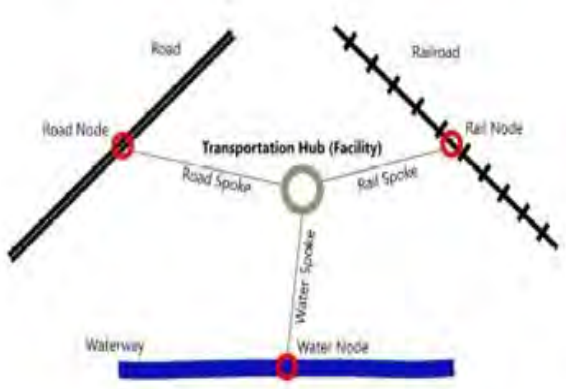

Figure 1: Three transportation networks integrated through intermodal transfer facilites (Swayne *et. al.,*2010)

Current Perspective of Intermodal and Multimodal Transportation

Contrary to multimodal networks, intermodal networks are connected through facilities which allow travellers and freight to transfer from one mode to another (Maria, 2000). While, other researchers used such common definition to position their contribution in the overall intermodal research field (Bontekoning *et al*., 2004). Definition should cover typical organisational aspects such as synchronised schedules, task division between modes, and multi actor chain management. A common conceptual model should reflect the distinguishing characteristics of intermodal transport and serves as framework for the whole intermodal research field. The definition of intermodal freight transport is the movement of goods in one and the same loading unit or vehicle by successive modes of transport without handling of the good themselves when changing modes (European Minister of Transport, 1997) could not be used as common definition because it only covers the physical

characteristics of intermodal transport. Table 1 and Table 2 below show the definition of intermodal/ multimodal from literature review.

Authors	Definition
Min (1991)	The movement of products from origin to destination using a mixture of various transportation modes such as air, ocean lines, barge, rail and truck
D'Este (1995)	A technical, legal, commercial, and management framework for moving goods door-to-door using more than one mode of transport
Jones *et. al.,* 2000	The shipment of cargo and the movement of people involved more than one mode of transportation during a seamless journey
Southworth and Peterson (2000)	Movement in which two or more different transportation modes are linked end-to-end in order to move freight and/or people from point to origin to point of destination
Maria (2000)	Integrated transportation system consisting of two or more modes connected through facilities which allow travellers and/or freight to transfer from one mode to another during a trip from an origin to a destination
Bontekonin*et. al.,* (2004)	Intermodal freight transport is the movement of goods in one and the same loading unit or vehicle by successive modes of transport without handling of the good themselves when changing modes (European Conference of Ministers of Transport, 1997)
Arnold *et. al.,* (2004)	Intermodal is defined by the European Conference of Ministers of Transport (ECMT) as the carriage of goods by at least two different modes of transport in the same loading unit (an Intermodal Transport Unit or ITU) without stuffing or stripping operations when changing modes
Bektas and Crainic, 2007	Transportation of people or freight from their origin to their destination by a sequence of at least two transportation modes. Transfers from one mode to the other are performed at intermodal terminals, which may be a sea port or an in-land terminal e.g., rail yards, river ports, airports, etc.
Crainic and Kim, 2007	The transportation of a person or a load from its origin to its destination by a sequence of at least two transportation modes, the transfer from one mode to the next being performed at an "intermodal terminal"
Vilko and Hallikas, 2011	Reiterate (Crainic *et. al*., 2004

Table 1: Definition of Intermodal Transportation Extracted from Literature Review

Authors	Definition
ASEAN Framework Agreement on Multimodal Transport (1998)	The carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal transport operator to a place designated for delivery situated in a different country. The operations of pick-up and delivery of goods carried out in the performance of a unimodal transport contract, as defined in such contract, shall not be considered as international multimodal transport
Van Schijndel and Dinwoodie, 2000	Multimodal transport involves the movement of cargo from shipper to consignee using two or more different modes under a single rate (Hayuth, 1987)

Nazery (2006)	Multimodal transport presents a means to move goods across the supply chain in a synchronized manner and promote strategic partnership amongst players in the transportation industry who are dispersed and divided across various transport modes.
Vilko and Hallikas, 2011	Multimodal supply chains are international transport combinations of various modes of transport such as ship, rail, and road, primarily through the use of containers

Table 2: Definition of Multimodal Transportation Extracted From Literature Review

Comparison between Multimodal and Intermodal Transportation
From Table 1 and Table 2, intermodal and multimodal sharing the same definition of the movement at least by two modes of transports from an origin point to a destination point. From Table 1, intermodal transportation stressed on "intermodal terminal" or "intermodal facilities" that is not even an issue in multimodal transportation (Bektas *et. al.,* 2007) (Vilko, *et. al.,* 2011) (Maria, 2000). Intermodal transportation also stressed on a seamless journey (Jones *et. al.,* 2000) without stuffing or stripping operations when changing modes (Arnold *et. al.,* 2004) (Vilko *et. al.,* 2011). From Table 2 alone, multimodal used international definition and included other countries as the point of destination (Southworth *et. al.,* 2000). Multimodal transportation also included ship as one of mode of transportation through the use of cargo/ containers (Vilko *et. al.,* 2011) (Schijndel *et. al.,* et. al., 2000). But in Table 1 the word shipment and cargo also being mentioned as intermodal transportation (Bektas *et. al.,* 2007) (Min, 1991) (Jones *et. al.*,2000) but was not being stressed by other authors.

Conclusion
Commonly, intermodal freight transportation involve container by using numerous mode of transportation including rail, ship or truck. It also could reduce cargo handling, improves security, and reduce damage as freight transportation are using container and no handlings of freight when changing modes. The process for unloading and unloading containers in terminals are usually using gantry crane or reach stacker. Meanwhile, multimodal transport is the transportation of goods under a single contract with at least by two modes of transportation for example by rail, sea and road. The carrier is responsible for the entire carriage even though it is being performed by several modes of transportation. The carrier does not have to possess all means of transport and is often performed by sub-carriers (actual carriers).

The usage of multimodal term for example "multimodal transportation" or "multimodality" could have been used to show a combination of two modes of transportations generally. Meanwhile the term "intermodal" at all times has been used to illustrate the process specifically. It means that the authors used the term multimodal if they wanted to discuss on more of one mode of transport and they stated intermodal term when they explained the operations involved especially when it comes to the terminal facilities for loading and unloading goods. As in a nutshell, intermodal and multimodal freight transportation almost sharing the same definitions. These terms can be used as long as it has the meaning of the movement of goods by at least two modes of transports from origin to destination. Different authors defined intermodal and multimodal transportation slightly differently, and it seems that many attempts to attribute different names to what is basically the movement of goods by at least two modes of transport and this is why they used these two terms on the same papers for the same meaning.

To be more accurate, the definition of intermodal transportation can be used with the used of containers and intercontinental exchanges (Bektas *et. al.,* 2007) by the existence of intermodal terminals. On the other hand, multimodal transportation definitions must involve international transport for example ship by the use of containers or cargo under a single contract. There is no right or wrong terms but depends to the authors whether to use the term generally or specifically.

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THE CONCEPTUAL FRAMEWORK OF LEAN SUSTAINABLE LOGISTICS

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ABSTRACT

Purpose: Logistics has an important role play in part of competitive strategies that relates logistics activities. It considers economics dimension such as cost, time and distance. Then, lean, which is well-known concept, can be applied to analyse logistics operations of companies. It uses seven wastes to identify and eliminate all of wastes in terms of value-added activities. Additionally, sustainable development is relevant logistics with three aspects comprising of environmental, social and economics for long-term benefits. So, this paper will present the linkage factors between sustainable development and lean concept on logistics activities.

Design/methodology/approach: This paper reviews on three subjects comprising of sustainable development, lean concept and logistics. It explores the factors which are related to each other. Then, it identifies the linkage factors that are the most important factors to combine these subjects. The linkage factors represent these subjects which have strong power to integrate between sustainable development and lean concept on logistics activities.

Findings: The result of this paper is the integration concept of three subjects comprising of sustainable development, lean concept and logistics. It presents the linkage factors between sustainable development and lean concept on logistics activities. Also, the sustainable wastes are the linkage factors between sustainable development and lean concept on logistics activities. They are classified into economics, environmental and social dimensions on each logistics activity.

Originality/value: The finding contributes towards the linkage factors between lean concept and sustainable development on logistics activities. These powerful linkage factors have potential to integrate these subjects and transform them into lean sustainable logistics.

Keywords: The linkage factors, Sustainable logistics, Lean Concept, Logistics Activities

Introduction

According to the Brundland Report in 1987, sustainable development is *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs".* It is a concept to balance three dimensions of sustainable comprising of economics, environment and social for achieving long-term benefits. The goal of sustainable development is to concern environmental issues while responding to essential aspects of social and economics. All of businesses need to be sustainable, so they should consider economics, environmental dimensions including social dimension for long-term development. Sustainable development can analyse overall of business process in order to develop and improve industries in Thailand (Puvanasvaran et al., 2011). It can achieve competitive goal for industry through balancing sustainable dimensions. Therefore, sustainable development is one of concept that can help organization meet need of them.

Thus, sustainable logistics is a new concept to consider both sustainable development and logistics management. It is providing benefits of economics, environmental ways and making social responsibility on logistics activities. Sustainable logistics mainly considers environmental and social impacts to manage movement and storage of goods between origin point to customer point for efficiency and effectiveness. While benefits of social, environment and economic growth are direct outcomes of logistics improvement, these are goals of sustainable development. Impacts of environmental and social including economic dimensions concern business operations such as

transportation infrastructure, high costs of resources and safety and health. Sustainability has become a key success for businesses. It can help them identify target area for improvement opportunity. Then, they have high performance of business for long-term benefits that are competitive in the global level.

To manage these impacts on sustainable logistics, lean is one of concepts for business improvement. Concept of lean emphasizes on eliminating all of wastes and adding more value. Wastes on lean context involve business process such as cycle time, work area, labor and supplier. Also, values on lean context are considered productivity, customer satisfaction, business performance and achieving long-term benefits. So, lean can be applied on sustainable logistics to improve business performance for competitiveness by focusing on waste reduction.

There have been numerous research works on sustainable logistics (e.g., Fisher, 2003; Hopwood et al., 2005; Chunguang et al., 2008; Ping, 2009; Miller et al., 2010; Witkowski, 2010; Dey et al., 2011). Sustainable logistics normally combines economic and environmental impacts for increasing more efficiency. However, although many researches have focused on the idea of sustainability within transportation and warehouse (Witkowski, 2010; Dey, 2011), there is very little work done to study sustainable logistics. The previous studies that only focused on field of transportation and warehouse did not cover logistics activities. They are insufficient to understand a role play of logistics activities for moving towards sustainability on industries. Additionally, lean is a main concept that can be applied with logistics management (e.g., Jones et al., 1997; Wu, 2002; Shamah, 2013; Sternberg et al., 2013). Figure 1 shows opportunities of research that are balance of three dimensions (economics, environment and social) and cover all of logistics activities. Also, lean concept can be applied to logistics by considering all of these sustainable dimensions.

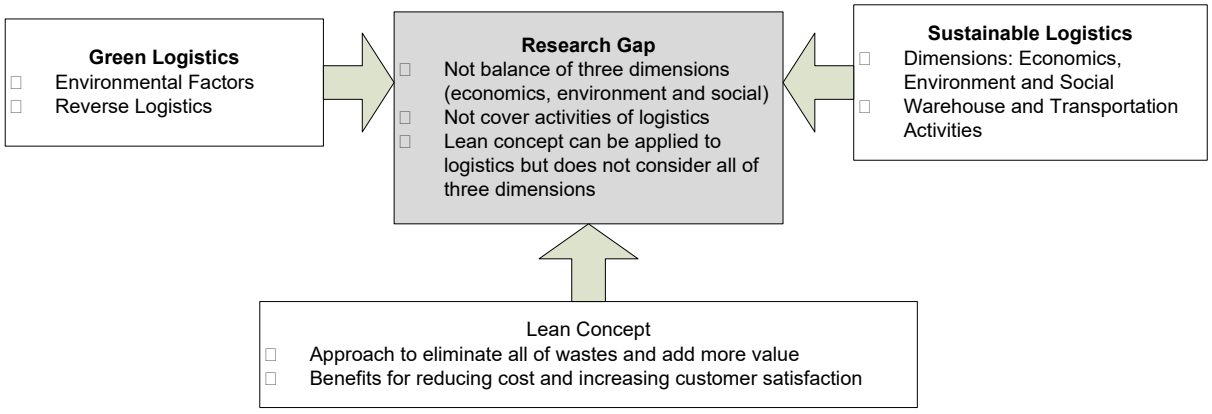

Figure 1: Opportunities of Research

There has not yet been a similar research for investigation both sustainable development and lean concept on logistics. Thus, this paper studies on sustainable development, lean concept and logistics. It aims to integrate these subjects by finding the linkage factors. They are the point of connection between sustainable development and lean concept on logistics. There are four sections in this paper. Firstly, this paper studies on sustainable logistics to understand how to apply sustainable development and logistics. Secondly, lean concept is related with sustainable logistics by studying lean concept on logistics activities and lean concept in terms of sustainability. Thirdly, this paper presents the conceptual framework of lean sustainable logistics. Final section is conclusions and the future research.

Sustainable Logistics

Traditionally, logistics involves the movement of products such as raw materials, parts, suppliers and finished goods that focuses on continuous flow of materials. Logistics management considers cost minimization objective, but environment situation is in deteriorating state. Then, sustainable development concept considers reducing the negative environmental impact and social impact, that are considering the critical fact.

Sustainable development is relevant supply chain management or logistics management with three aspects of sustainable development. However, many researches have focused on the idea of sustainable development within the logistics context (Witkowski, 2010; Dey, 2011; Monnet, 2011).

Sustainable logistics combines both cost and environmental impacts to strengthen logistics. Sustainable logistics aims to improve the logistics and business performance, reduce logistics cost and environmental impact. Logistics activities identify and eliminate inefficiencies, and reduce carbon emission for moving toward sustainability. Witkowski (2010) and Monnet et al. (2011) emphasized transport activity for implementing sustainable transport system. Transport, which is one of logistics activities, has more carbon emission and pollutants. Sustainable transport system makes a positive impact on environmental, social and economic. Indicators are defined to measure the efficiency of the global solutions for improving transport sustainability. Based on literatures, these researches apply sustainable logistics by focusing on transportation. They are explicitly results of environmental and social impacts. So, sustainable logistics is the main context of this paper. It can help organization improve business performance. Additionally, it needs to increase competitive advantage. Next section studies lean concept that is related with logistics activities and sustainable development.

Lean concept with logistics activities and sustainable development

Lean concept aims to identify and eliminate wastes of all processes in terms of non-value-added activities for improving business competitiveness. Generally, lean concept can help organizations improve their business competitiveness by focusing on productivity, efficiency and quality of products or services. Waste, which is not creating value for firms, prevents value-added flow of materials. Moreover, lean concept can be applied with several issues in order to improve business performance. So, this paper studies both logistics activities and sustainable development that are the main subjects to study with lean concept, as briefly reviewed below;

Lean concept on logistics activities

Logistics activities focus on internal activities and processes that involve continuous flow of materials. Nine logistics activities are classified by Grant et al. (2006), comprising of customer service and support, demand forecasting and planning, purchasing and procurement, inventory management, order processing and logistics communications, material handling and packaging, transportation and facilities site selection, warehousing and storage, and return goods handling and reverse logistics. They are considered primary activities of logistics management that can be applied to several issues, for example, performance measurement, simulation of manufacturing and decision making (Chen et al., 2002; Franzil, 2006; Banomyong and Supatn, 2011).

Logistics Activity	Types of waste	Examples
Transportation	Over Production	Increasing the salary per year of the administrative staff
	Transportation	Drive same way
	Waiting	Occurred at unloading and loading
		Unnecessary transportation
	Defects	Transport time was not observed in large quantities
	Over processing	A driver would drive back the same he came
	Resource utilization	Not planning critical resources
	Uncovered assignments	Accept all transport orders from all customers without making any profitability assessment
Inventory and warehouse	Unnecessary inventory	Unnecessary stock (finished goods)
	Defect	Hide defects
	Waiting	Changing set-up time, idle times and movement of workers

Table 1: Example of Seven Wastes in Transportation Activity

Lean concept can be applied to analyse logistics activities of companies by identifying and eliminating all of wastes as well as adding more vales. Sternberg et al. (2013) applied lean approach to identify waste in transportation activity that is one of logistics activities for potential improvement. Moreover, Bamber (2000) identifies wastes in inventory process that are WIP and finished goods. These wastes are categorized in inventory, defect and waiting wastes. To change set-up time, materials are waiting more WIP (Sullivan, 2002). Also, idle times or movement of workers caused waiting waste of inventory activity (Domingo, 2007). Table 1. shows examples of waste types in transportation and inventory activities. So, each logistics activity is related with waste contexts.

Based on literatures, lean concept is used to identify and eliminate wastes of logistics activities for their business performance. So, wastes are related with lean concept and logistics activities. They can be identified on each logistics activity in order to eliminate them. On the other hand, lean concept in term of sustainability is brief reviewed in the next section.

Lean concept in term of sustainability

Based on literatures, lean is an initiative technique that has strong basic skill for identifying and eliminating traditional organization and manufacturing waste, including environmental waste. These wastes are associated with moving toward sustainability. Achievement of business values applied lean initiative for eliminating environmental wastes (Handfield et al., 2005; Kidwell, 2006; Bergmiller, 2011; Vinodh, 2011). Lean concept and sustainable development are more important on measure of operational performance. Miller et al. (2010) has integrated lean tools and sustainability concepts by focusing on environmental impacts. Wastes are the main issue of lean concept for elimination that is considered with three of sustainable dimensions, comprising of economics, environment and social, as shown in Table 2.

Sources	Sustainable Dimensions		
	Economics	Environment	Social
Bember and Dale, 2000			✓
Kilparick, 2003; Ray et al., 2006; Ramesh, 2008; Miller et al., 2010; Taleghani, 2010; Koranda et al., 2012; Mehta, et al., 2012; Maia, et al., 2012; Maia, et al., 2013; Roosen and Pons, 2013; Tenescu and Teodorescu, 2014	✓		✓
Handfield et al., 2005; Kidwell, 2006; Kosztyó, et al., 2008; Torres and Gati, 2009; Bergmiller, 2011; Faulkner, et al., 2012; Li, et al., 2012; Müller, et al., 2013; Yusof, et al., 2013; Georgiana, 2014	✓	✓	
Vinodh et al., 2011	✓	✓	✓

Table 2: Wastes in terms of Sustainable Development

Economics dimension aims to lower costs and improve their productivity and quality. Lean wastes in terms of economics dimension follow seven wastes that are identified by Taiichi Ohno. This dimension presents waste from manufacturing process.

Sources	Environmental wastes
Torres and Gati, 2009; Koranda et al., 2012; Vinodh et al., 2011	• Refer to unnecessary usage of resources or substance released to air, water or land • Classified into seven wastes: overproduction, over processing, waiting, transportation, defects, inventory and storage of WIP and defective parts
Bergmiller, 2011	• Environmental impact affected business operations that should be identified for waste reduction • Environmental wastes associated with moving toward sustainable business practices
Kidwell, 2006	• Environmental wastes are very significant reduction in lean manufacturing • Examples of environmental wastes are excess energy and water usage, hazardous waste, or solid waste that overlooked saving opportunity
Handfield et al., 2005	• Associated with disposal of product at the end of useful life
Kosztyó, et al., 2008; Faulkner, et al., 2012; Li, et al., 2012Maia, et al., 2012; Maia, et al., 2013; Müller, et al., 2013; Georgiana, 2014	• Unnecessary usage of energy and water from manufacturing • Carbon emission from transportation and manufacturing
Yusof, et al., 2013;	• Polarization resources

Table 3: Descriptions of Environmental Wastes

In addition, environmental wastes are important wastes to consider in business operations. Many researches described definition of environmental wastes, following as Table 3. Normally, they refer to natural resource usages that affected environmental impacts. Adding environmental wastes are significant reduction in manufacturing. Moreover, seven wastes by Ohno are defined in terms of environmental wastes.

Additionally, wastes of people associates with social dimension that focused on only employee in organization, following as Table 4. They highlight utilization of employee such as physical skills, creativities and abilities. Customers, suppliers and community are not considered on this dimension that are important for long-term development.

Sources	People wastes
Bember and Dale, 2000	Employee commitment, labor utilization
Kilpatrick, 2003	Underutilization of mental, creative and physical skills and abilities, Poor workflow, organizational culture and high employee turnover
Ray et al., 2006	Not using employees' mental, creative or physical abilities
Ramesh, 2008	Need for additional training
Miller et al., 2010	Not using people's minds and getting them involved
Taleghani, 2010	Workforce is not confident about the best way to perform tasks
Vinodh et al., 2011; Mehta, et al., 2012;	Underutilization of employee creativity
Roosen and Pons, 2013	Underutilization of people added later in development
Tenescu and Teodorescu, 2014	Waste of unused human talent

Table 4: Descriptions of People Wastes

Lean concept in terms of sustainability aims to maximize profit and minimize lead time, costs and environmental impacts. Also, wastes in terms of sustainability are the main point to connect between lean concept and sustainable development. The wastes can be identified into three of sustainable dimensions. Seven wastes, which are identified by Ohno, highlight to improve quality and productivity including reduce costs of business operations. They are related with economics dimension. Also, environmental wastes are identified to reduce environmental impacts that are environmental dimension. Additionally, people wastes refer to impacts of employee and customer. So, these wastes involve sustainability for long-term development

The conceptual framework of lean sustainable logistics

From above mentioned, this paper studies on three subjects that consist of sustainable development, lean concept and logistics. Then, it focuses on nine logistics activities comprising of customer service and support, demand forecasting and planning, purchasing and procurement, inventory management, order processing and logistics communications, material handling and packaging, transportation, facilities site selection, warehousing and storage, and return goods handling and reverse logistics. Also, sustainable development considers economics, environmental and social dimensions for achieving long-term benefits. Moreover, lean concept aims to identify and eliminate all of wastes for improving business competitiveness. Thus, this paper reviews on three subjects in order to discover the factors which are connected to each other. Then, they can be integrated by identifying the linkage factors that the most important factors to combine these subjects. The linkage factors represent these subjects which have potential to integrate between sustainable development and lean concept on logistics activities for increasing competitive advantages.

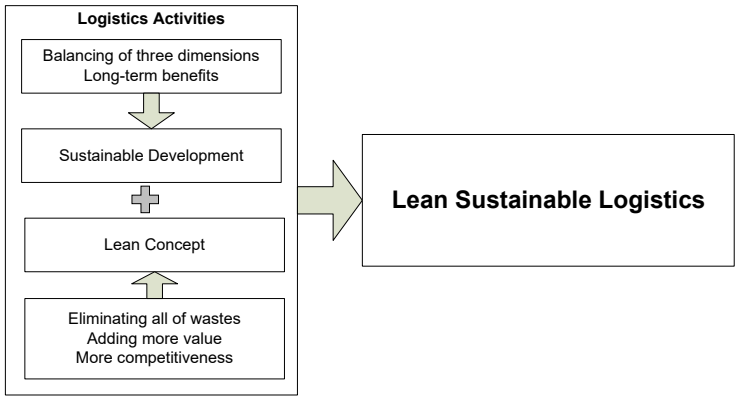

Figure 2: Concept of Lean Sustainable Logistics

Based on literature review, to integrate sustainable development, lean concept and logistics activities, the linkage factors are explored. The linkage factors are wastes that are classified into economics, environmental and social dimensions on each logistics activity, following as Figure 3. Wastes on economics dimension are identified by seven wastes that consist of overproduction, motion, waiting, over processing, transportation, inventory and defects. It mainly considers cost and time. In addition, environmental wastes refer to unnecessary resource usages such as energy, water, electric, and land including hazard waste. They affected environmental impacts. So, they have to be reduced on each logistics activity. Also, people wastes are categorized into two groups comprising of industrial context and community. On one hand, wastes on industrial context are underutilization of labor involving suppliers and employees. On the other hand, wastes on community consider health and safety of customer and community. So, these wastes are measured by people satisfactions that are affected social impact. Then, these wastes consider economics, environmental and social dimensions that used to identify on each logistics activity. Therefore, the linkage factors between sustainable development, lean concept and logistics activities are the sustainable wastes. They are important context to implement on lean sustainable logistics.

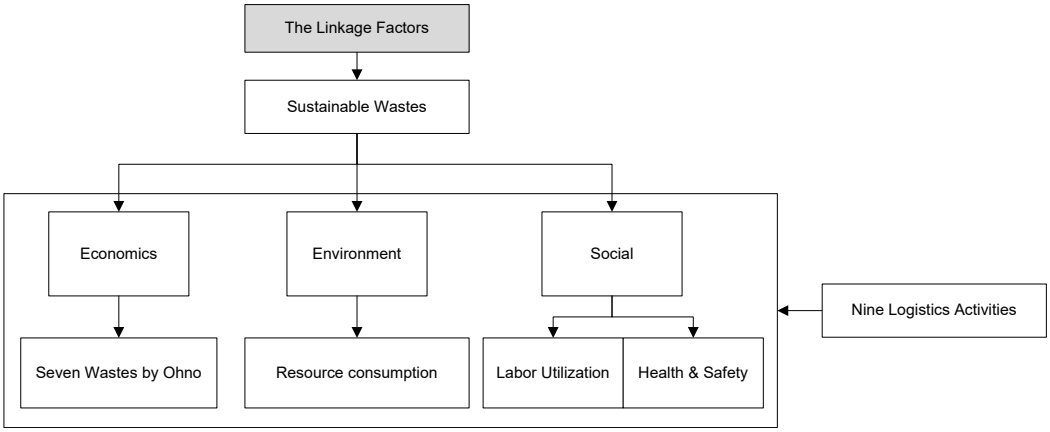

Figure 3: The Linkage Factors between Sustainable Development and Lean Concept on Logistics Activities

So, sustainable wastes are the linkage factors that are classified into economics, environmental and social dimensions on each logistics activity. They are the important factors to connect sustainable development, lean concept and logistics. Then, they are validated by statistical methods in the future research.

Conclusions and Future Research

This paper presents the integration concept of sustainable development, lean concept and logistics. Firstly, sustainable development considers balancing of economics, environmental and social dimensions for achieving long-term benefits. Secondly, under logistics context, this paper focuses on nine logistics activities. Finally, lean concept aims to add value creation by identifying and eliminating

all of wastes. So, these subjects are integrated by finding the linkage factors. They are the essential factors between sustainable development and lean concept on logistics activities. As a result, the linkage factors are the sustainable wastes based on literature review. They are classified into economics, environmental and social dimensions on each logistics activity.

The linkage factors have potential to integrate these subjects and transform into lean sustainable logistics. To implement lean sustainable logistics, sustainable wastes are identified and eliminated on each logistics activity. Then, they can be applied to modify tools and methods of lean for implementing lean sustainable logistics. These linkage factors will be validated by survey instruments in the future research. They are interviews and questionnaires by the logistics experts and green industries. Next, the linkage factors will be used in statistical methods to prove factors clearly. So, the linkage factors can be used to develop tools and methods of lean for implementing lean sustainable logistics.

Acknowledgement
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FOOD VALUE CHAIN PRODUCTION IMPROVEMENT USING QUALITY FUNCTION DEPLOYMENT TECHNIQUE

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Introduction

Due to the increasing demands of consumers who are constantly on the rise, the present food industry has gone through a dynamic change through technology and competition. In order to respond to the need of consumers in the current competitive food industry, while maintaining a competitive price, improvement of product and production management is crucial. The competition in this industry includes competing in the design, development, and production of various diversified products. The needs of the consumer and the manufacturing process are no more than a repetition of the process. To reduce the time in production processes and reduce the waiting of time that occurs in production, constant amendments in processes are necessary, while maintaining the production cost.

The Porn-Sawan Factory in San Kamphaeng, Chiang Mai is a small and medium sized enterprise (SME) which produces meatball related products. The company has been established for the past 12 years and currently facing difficulties in responding to customers' demand in volume and quality. In order to remain profitable in the current business environment, capacity and quality improvement are required in order to keep pace with competitors. The goal is to reduce process costs while responding to the needs of consumers. The researchers selected this factory as case study due to its clarification of problem and accessibility to information. For the reasons mentioned above and academic interest, the researchers have embraced the principle of value chain (Value Chain) for the analysis activities to acquire whether the operations can be improved by reducing the duplication of production activities and analysis of robust activity throughout the process by Value Stream Mapping (VSM). It is expected that this research will improve the whole chain to be more effective and reduce costs throughout the chain resulting in increasing competitiveness. Based on these tools, researchers can specify the root cause of the problem. Using the principle of Quality Function Deployment (QFD) as qualitative techniques to analyse and design the improvement of product or services that focus on responding to the needs of the consumer, consumers' need can be transformed into technical data. This technical requirement is communicated to manufacturing process to develop product prototype that can be used for comparing with the original products.

Theory and Related Research

Value Chain

According to Porter (1995), the strategy to create a competitive advantage by positioning the product with competitive advantage requires both price and differentiation. In order to understand and create a distinctive product, understanding questions associated with the product such as, supporting activities performed by internal and external of the organization that affects the design, manufacture, marketing and distribution of products to consumers are essential. In order to analyse activities involved in the production processes, identification of activities are important to analyse the current product differentiations in order to gain competitive advantages throughout the value chain (Figure 1).

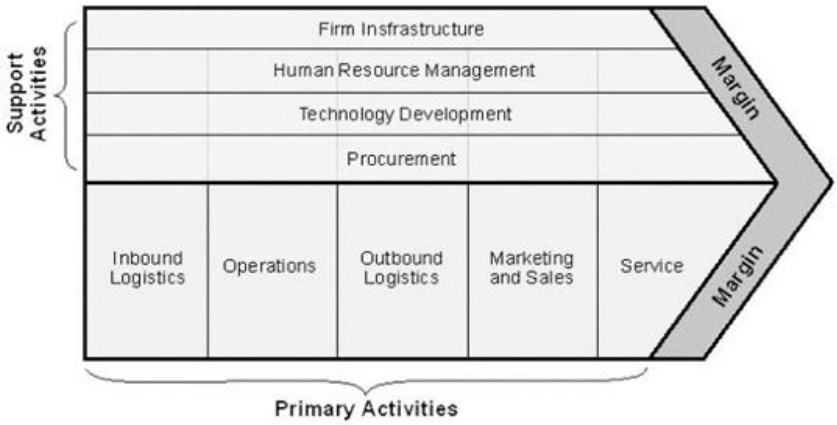


Figure 1: Michael E. Porter's (1998) Concept of Value Chain.

The concept of Porter (1998) has helped us understand the how each particular business activities contribute in creating value for customers. Value created by the company can be measured by the price that the consumer agrees to pay for that product or services. Under this concept, there are two main types of activities, Primary Activities and Support Activities. Primary activities are operational activities which has direct impact on the supplies and demands of the product. Supporting activities are facilitating activities which have direct influence on the production capacity and product quality. Both activities are inseparable and contribute to the overall well-being of the firm (Chao, 2011).

Value Stream Mapping (VSM)

Value stream map (VSM) is one of the lean concepts that uses diagram to show the production of the product. It shows the flow of raw materials and information needed to produce the product. It is useful in the identification, or indicates, the process steps that are "Value Added" and "Non-Value Added" to the product. A non-value added steps are known as "Waste" that we need to find ways to eliminate. Value stream map is a simple tool to visualise the flow of products (Product Movement), from raw materials to the final consumer. Lean organisations often begins with Value stream map to identify waste prior to using other Lean tools.

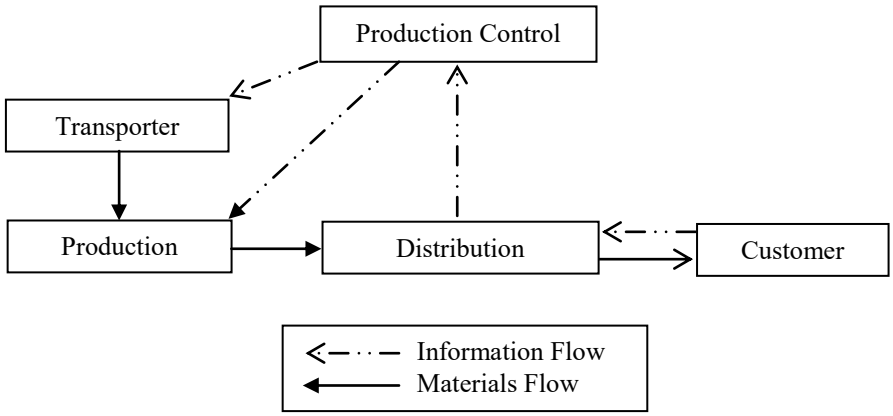


Figure 2: Product Flow Diagrams

Quality Function Deployment Techniques (QFD)

This technique helps to plan, design and developing products to meet the needs of consumers (Consumer Oriented Product Development) Instead of focusing on the development of technological aspects alone. The goal of this technique is to ensure that the products developed responds to customer expectation based on available resource and capabilities. The principle of the technique is to link the information of customer needs, based on market research and technical specifications of the product, together with production data to assist in developing a customer-orientated products through a data matrix. It can also be used as a communication tool to create a systematic link between Marketing, Product Development, Quality Control Manager, and Production Departments.

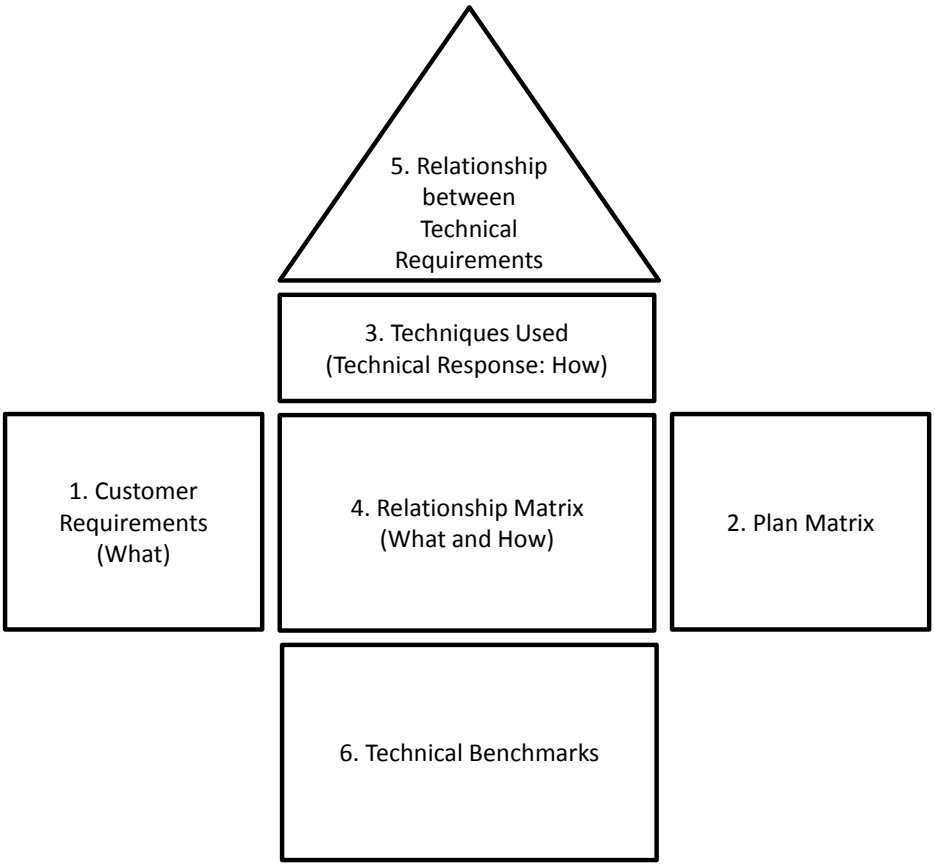


Figure 3: The House of Quality (QFD)

Methods

Overview of Manufacturing Process and Case study

As the preliminary data for the analysis, the product characteristics and its manufacturing processes are to be identified.

Value Chain Analysis

As case study, we will perform Value Chain analysis on activities and process steps to produce meatball, starting from incoming raw materials to the final product and distribution.

Value Stream Analysis (Value Stream Mapping: VSM)

To analyse the nature of works in the production line, Works are divided into 3 types (Hines and Rich, 1997) as follows

- Works that add value to products and customers (Value Added). Activities that are valuable to the operation and products. Starting from the raw material stage, components used in the production until to last process of product, we want to identify labor requirements, machinery in the manufacturing, etc. Including all the information and require decisions to make product.

- Works that do not create value but are necessary (Necessary but Non-Value Added). Activities that consider as wasted but it may be necessary to the operating. Characteristics of these wastes may not be able to eliminate but can be minimized.

- Works that do not added value to products and customers (Non Value Added). An unnecessary activities that consider as wasted, such as, waiting time, the same activity repeatedly (Double Handling), etc. These activities should be eliminated from operations.

The Market Survey
Structured interview technique is used to collect information regarding to customers' need. A total 200 interviews was conducted in the local traditional markets of San Kamphaeng.

Building House of Quality for Product Planning Matrix
The process of converting voice of consumers (VOC) or the needs of the consumer (Customer's Requirements) from a questionnaire survey on the product. This was done by converting them into technical features (Technical Characteristics). This is the product's requirements under a matrix called the House of Quality (HOQ).

Develop Prototypes
Create a product prototype base on House of Quality. By transferring the needs of consumer to the manufacture requirements, the developed product is producible and meets the needs of customers.

Research Findings

Overview of the operation analysis

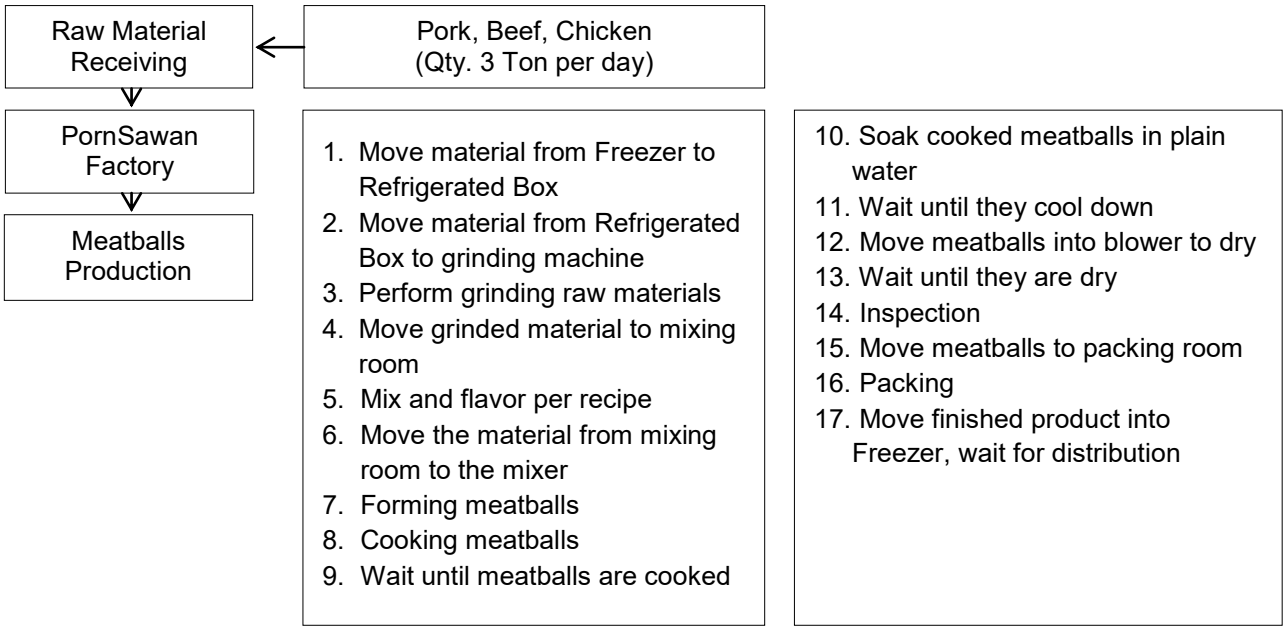


Figure 4: The flow of Information in the case study plant

Value Chain Analysis

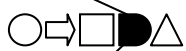
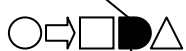
Activity	Average Time (min)	Symbol	Activity Type
Move material from Freezer to Refrigerated Box	30		NNVA
Move material from Refrigerated Box to grinding machine	5		NNVA
Perform grinding raw materials	35		VA
Move grinded material to mixing room	8		NNVA
Mix and flavor per recipe	40		VA
Move the material from mixing room to the mixer	12		NNVA
Forming meatballs	45		VA
Cooking meatballs	38		VA
Wait until meatballs are cooked	25		NNVA
Soak cooked meatballs in plain water	25		NNVA
Wait until they cool down	10		NNVA
Move meatballs into blower to dry	15		NNVA
Wait until they are dry	20		NNVA
Inspection	45		VA
Move meatballs to packing room	15		NNVA
Packing	45		VA
Move finished product into Freezer, wait for distribution	20		NNVA
Total	433		

Table 1: Analysis of the Value Chain

From the case study of typical meatballs plant (before improvement) above, the study found that the time it takes to produce meatballs product is 433 minutes (or 7 hours and 22 minutes) with a total of 17 production steps and/or activities.

The market survey, using a questionnaire

Needed	*Average*	*Original Product (A)*	*Competitor (B)*	*Competitor (C)*	*Competitor (D)*
Soft crispness when chewing	4.23	3.40	4.35	3.86	2.41
Silky Taste	3.88	3.35	4.30	3.81	2.36
Not too salty	4.08	3.32	4.27	3.78	2.33
Feel bouncy when chewing	4.41	3.35	4.30	3.81	2.37
Fine grain texture	4.40	3.35	4.30	3.81	2.36
No Odor Small	4.42	3.34	4.29	3.80	2.35
No fishy smell of meat	4.56	3.30	4.25	3.76	2.31
Smooth Surface	4.60	3.29	4.24	3.75	2.30
Right Size	4.63	3.31	4.26	3.77	2.33
Variety	4.89	3.33	4.28	3.79	2.34

Table 2: The Results of Market Survey on Senses

Creating Quality Function Deployment (QFD)

Customer Requirements (What)
Soft crispness when chewing
Silky Taste
Not too salty
Feel bouncy when chewing
Fine grain texture
No Odor Small
No fishy smell of meat
Smooth Surface
Right Size
Variety

Table 3: Customer Requirements (What)

Plan Matrix

Original Product Ratings (A)	*Champ Meatballs (B)*	*Papee Meatball (C)*	*Wanna Meatball (D)*	*Planed Rating*	*Improvement*	*Improvement Weight Ratio*
3.40	4.35	3.86	2.41	4.35	1.19	5.03
3.35	4.30	3.81	2.36	4.30	1.19	4.62
3.32	4.27	3.78	2.33	4.27	1.19	4.86
3.35	4.30	3.81	2.37	4.30	1.19	5.25
3.35	4.30	3.81	2.36	4.30	1.19	5.24
3.34	4.29	3.80	2.35	4.29	1.19	5.26
3.30	4.25	3.76	2.31	4.25	1.19	5.43
3.29	4.24	3.75	2.30	4.24	1.19	5.47
3.31	4.26	3.77	2.33	4.26	1.19	5.51
3.33	4.28	3.79	2.34	4.28	1.19	5.82

Table 4: Plan Matrix

Techniques used (Technical Response: Hows)

▲	▼	◆	▲	◆	▲	▲	▲	▲	▲
Crispy	Good Taste	No more than 3% Salt	Bounce	Fine Grain	No Odor	No fishy smell of meat	Meat and flour Mixture	0.8-1.0 inch	Round or Oval Shape

Table 5: Techniques used (Technical Response: Hows)

Relationship Matrix (What & How)

▽	▽	▽	▽	▽				▽	▽
▽	○	○	○	○	○	○	○	▽	○
○		○						○	○
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
	▽	▽		○	○	○	○	○	○
	○	○		○	○	○	○	○	○
				○				○	○
○	○	○	○	○	○	○	○	○	○
○	○	▽	○	○	○	○	○	▽	▽

Table 6: Relationship Matrix (What & How)

Relationship between Technical Requirements

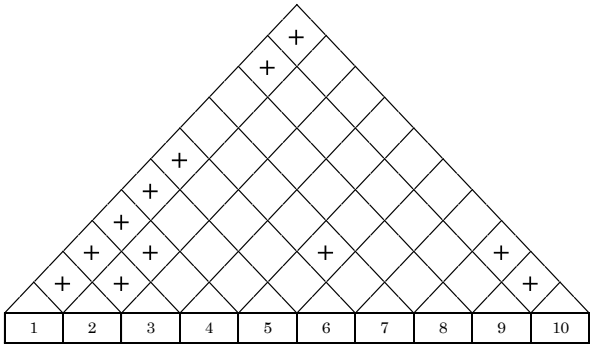


Table 7: Relationship between Technical Requirements

Technical Benchmarks

Objectives	*Crispy*	*Good taste*	*Among of Salt*	*Bouncy Feeling*	*Fine Grain*	*No Odor*	*No fishy smell of meat*	*Surface Texture*	*Not more than 1 inch. In Size*	*Variety*
Absolute IMP*	89.69	100.6	108.84	84.35	84.35	111.39	111.39	111.39	126.53	62.55
Relative IMP (%)	9.05	10.15	10.98	8.51	8.51	11.24	11.24	11.24	12.77	6.31

*IMP: Important Rating

Table 8: Benchmark Technical (Technical Benchmarks)

Experimental for Product Improvement by Quality Department

Figure 5: Experiments for Product Improvement

Figure 6: Prototypes Product

Summary findings

From this research, unnecessary processes are identified in the case study factory which appeared to be a major cause of long production cycle time. Improvement was implemented base on competitor benchmarking by modification and elimination of activities that does not provide value to the product. Before improvement activities, the production cycle time was 433 minutes and after improvement it was dramatically reduced to 375 minutes, or 13.40 percent in improvement. This allows the firm to reduce production lead time and to gain opportunity to increase the production capacity. This not only responds to the voice of the customers but also improve product delivery lead-time. The level of satisfaction in products was quantitatively determined. Base competitors' information, the plant has improved their product to respond to customers' suggestions on taste and quality. This has resulted in gaining a larger share in the local market and more competitive in terms of quality. An average customer satisfaction index has shown an improvement according to the needs of the customer.

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COURIER SERVICE QUALITY FOR BUSINESS SUSTAINABILITY

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ABSTRACT

Purpose: This literary paper attempts to provide an insight on published literature pertaining to current issues and challenges affecting the courier service industry, transportation modes and networks and also the relevant factors affecting courier business sustainability

Design/methodology/approach: This paper presents a literature review from various publications. Relevant journals, past previous studies and research done on courier services, quality of courier services, business performance and business sustainability. Literature shall also encompass information and statistics from published business reported and business review from courier business associations, courier service provider reports and government annual reports. Also, latest information related to courier service information technology and related websites.

Findings: Based on published literature, the courier service quality dimensions encompass quality service delivery, just in time, services offering, understanding customers" needs, communications, credibility, creativity and costs. Additionally, for courier business sustainability, business performance measures that are generally used for service providers encompass sales and revenue, customers, long term contracts, competition, service design, transport networks and transport costs, effective information system for tracing and traceability and last but not least customer complaints.

Research limitations/implications: This literature focused on courier service quality dimensions for business performance and sustainability both local and global contexts.

Originality or value: This paper provides inputs for potential variables and constructs for the future research framework.

Introduction
Starting from the late 1990s, Malaysia is looking forward to be an innovation-led economy. The Ministry of Science, Technology and Innovation (MOSTI, Malaysian science & technology indicators 2010) reported that Malaysia was ranked at 24th in the Innovation, Competitiveness and also ranked at 26th in the Global Competitiveness Index for the year 2010-2011. One of the main contributions of this achievement was rooted from the service sector. Postal and courier service is part of the service sector that continues to develop. The global mail and package delivery was estimated to reach USD500 billion in 2008 (Universal Parcel Union, 2010) and is expected to keep increasing. The recent launch of the Economic Transformation Program (ETP) by the government of Malaysia is expected to have more positive impact on the sector.

Today, there are many large companies offering next-day courier industries, include and UK divisions of worldwide couriers such as FedEx, DHL, UPS and TNT. The Courier industry in the United States is a $59 billion industry, with 86% of the business shared by only four companies, including (DHL) , FedEx and UPS.The remaining 14% shared among almost 11,900 other small businesses ranging in size from 1 employee to over 600 (Terry, 2013).

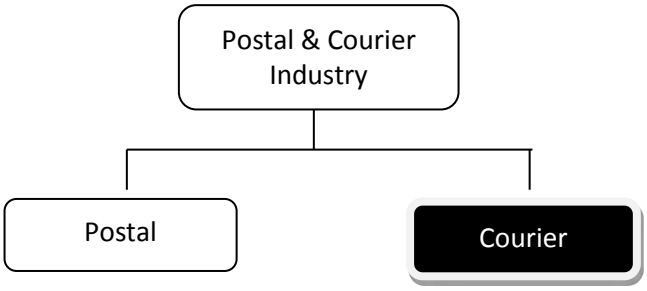

Figure 1: The structure of the postal and courier industry

Postal services are primarily used for the delivery of letters, cards, documents and small packages that required postage stamps, prepaid envelopes, sachets or boxes. These items are played in post boxes or post office counters where they are collected and subsequently delivered to destinations. Postal services do not provide pick up services or confirmation of delivery. There are no guaranteed the postal can be delivered on time and it based on postal company schedule and it will take 2 or 3 days from days of pick up (Gdex, 2013).

Generally, postal and courier services relate to delivery of parcels, packages, documents, letters, and printed materials. Basically, the postal transportation process consists of mail collection, input sorting, organize the movement of mail (global area transportation), output sorting, and distribute mail (Gruner, et al, 20000). The complexity of the process, therefore need to be assisted by ICT to ensure that the correct mail can be received by the customer on time.

Courier business in global context

Today, there are many large companies offering next-day courier industries, include and UK divisions of worldwide couriers such as FedEx, DHL, UPS and TNT. The Courier industry in the United States is a $59 billion industry, with 86% of the business shared by only four companies, including (DHL) , FedEx and UPS.The remaining 14% shared among almost 11,900 other small businesses ranging in size from 1 employee to over 600 (Terry, 2013).

The courier industry simplifies and speeds the process of transporting goods. It organises the collection, usually at the end of the business day, allows the sender access to information on the progress of shipments from pick-up to delivery, and provides proof of delivery. Where shipments cross international borders, The courier industry handles customs clearance as well as the payment of duties and taxes as required (The impact of delivery industry of the global economy, 2009).

There are many 'specialist' couriers usually for the transportation of items such as freight or palettes, sensitive documents and liquids.

Courier Industry in Malaysia Context

Courier industry in Malaysia is relatively young. In the early 1970s, foreign companies such as DHL beginning their operations in Malaysia. The first local courier company to operate in Malaysia is City-Link Express (M) Sdn Bhd which began its operations in 1979. This was followed by ABX Express (1984), Nationwide Express (1985). POSLAJU (part of the Pos Malaysia) and UPS appeared on the scene in 1988. FEDEX came in 1991. In 1997 a local outfit GD Express began operating. Today the domestic courier industry is mainly dominated by City-Link Express, Nationwide Express and GD Express (GDex). Both Nationwide and GDex are a public listed company while City-Link Express had remained firmly in the hands of its founder, David Tan (Economic Transformation Program (ETP) Annual Report, 2012).

The recent launch of The Economic Transformation Program (ETP) by government Malaysia (Edition annual report 2012) mention that courier, post and broadcast GNI contribution is expected to grow by 5.2 per cent annually over the next 10 years, contributing RM1.6 billion in incremental GNI and creating 7,563 new jobs by 2020 (2012, Economic Transformation Program (ETP) Annual Report). This sector will also offer a broader range of services including commercial transaction fulfillment, warehousing, inventory management, demand planning for manufacturers and assembly services. With the rise of e-commerce in the country, the post and courier sector are expected to benefit by

offering services specifically designed to meet the needs of an increasing number of online merchants (Economic Transformation Program (ETP) Annual Report, 2012).

In 2009, the postal and courier sector in Malaysia recorded a turnover of nearly RM 3 Billion. The sector comprises Pos Malaysia Berhad as the universal provider. As at 30 June 2013 the number of courier licenses decreased to 93 company compare with 2012 with 105 companies (The National Postal Strategy 2010-2014).

Literature review

Service quality offered by courier services is an important indicator to assess a company"s performance. Service quality in the courier services has mainly been researched on the technical and/or on corporate strategies (Douligeris & Pereira, 1994; Gruber, Abdou, Richards, & Williams, 1986; Jung, 1996a; 1996b; Lim, Widdows, & Park, 2006; Lynch, Buzas & Berg, 1994; Takahashi, 1988). Due to the inherent intangibility, inseparability, heterogeneity and perish ability of characters, service quality can be defined as a consumer"s overall impression of the relative efficiency of the organization and its services.

The dominant conceptualization and measurement of service quality is the SERVQUAL instrument developed by Parasuman et al. (1988). SERVQUAL was identified as determinants of perceived quality and indicated by the arithmetic differences between customer expectations and perceptions across the 22 measurement items. Using factor analysis, SERVQUAL further is condensed into tangible, reliability, assurance and empathy dimensions, which are generic across service contexts. However, a number of authors investigated the number of dimensions and stability of items across different industries by empirical tests.

They conclude that the five component factor structure is not confirmed in any of the research samples. This implies that service quality attributes are context-dependent and should be selected to reflect the service environment investigated Cronin et al (1992, 2002) criticized SERVQUAL" poor reliability.

The fourth perspective is manufacturing based approach. This perspective is supply-based, and is concerned primarily with engineering and manufacturing practices. It focuses on conformance to internally developed specifications, which are often driven by productivity and cost-containment goals. The fifth perspective is value-based definitions define by quality in terms of value and price. By considerng the trade-off between performance and price, quality comes to be defined as “affordable excellence”. Thus, based on the David Gavin definition of quality, we can say that Pos Laju quality can be defined as in value-based quality.

Service Quality

Service quality is defined as “the customer"s overall impression of the relative inferiority / superiority of the organization and its services” (Bitner and Hubbert, 1994,p. 77). Other authors suggested that the concept of service quality can be defined as intangible activities or intangible prodcut (Gro¨nroos, 1990), built environment (Bitner, 1992), service product, delivery (Rust and Oliver, 1994), and service outcome and process (McDougall andLevesque, 1994). Service quality perceptions on the othr hand are positively related to several key consumer variables such as customer satisfaction (Oliver, 1980; Cronin and Taylor, 1992) and customers" expectations (Chelladurai and Chang, 2000; Reeves and Bednar, 1994; Zeithaml et al., 1990).

Currently, there are numbers of different factor structures and measurement scales available in different researches by different authors; SERVQUAL (Parasuraman et al., 1988) RECQUAL (Crompton et al., 1991), SERVICESCAPE (Bitner, 1992), SERVPERF (Cronin and Taylor, 1992), QUESC (Kim and Kim, 1995), TEAMQUAL (McDonald et al., 1995), SPORTSCAPE (Wakefield et al., 1996), CERM-CSQ (Howart et al., 1996), and SSQRS (Ko and Pastore, 2004, 2005).

In addition, based on Bitner"s (1992) SERVICESCAPE, Wakefield and Blodgett (1999) classified service quality into tangible and intangible factors. Service product itself is intangible and cannot be tested before it is produced. Several researchers (e.g. Berry,1980; Lovelock, 1980; Parasuraman et al., 1985; Shostack, 1977) argued that understanding intangible service is very important.

However, Parasuraman et al. (1988) suggested that the service quality has five dimensions which includes tangibles, reliability, responsiveness, assurance and empathy. The first dimension, reliability means ability to perform the promised service dependably and accurately. Responsiveness, the second dimension means willingness to help customers and provide prompt service and security as freedom from danger, risk, or doubt. The third dimension, assurance is a knowledge and courtesy of employees and their ability to inspire trust and confidence to the Pos Laju customers. The fourth dimension, tangibility refers to the appearance of physical facilities, equipment, personnel, communications material, and other customers in the service facility. The tangible aspect of event quality can include the physical environment variables such as ambience (e.g. temperature, air quality, noise, and music), space (e.g. layout, equipment, and furnishings), and signage (e.g. style, interior decoration, size). The tangible dimension relates to the servicescape offered by the Pos Laju. The fifth dimension is the reliability, which means ability to perform the promised service dependably and accurately.

Comparing performance to expectations works well in reasonably competitive markets which customers have sufficient knowledge to choose a service that meets their needs and wants. However, in uncompetitive markets or in situations in which customers do not have any choices because the switching would be prohibitive, because of time or location constraints. If the customers‟ expectations are low and actual service delivery proves to be better than what the customer‟s expected, we can hardly claim that the customers are receiving good quality service (W. Jochen & M. S. Anna, 2001).

Satisfaction-based research into quality assumes that customers are dealing with services that are high in search or experience characteristics. Process factors include customers‟ feelings about the personal style of individual providers and satisfaction levels with those supplementary elements they feel competent to evaluate. As a results, customers‟ perceptions of core service quality may be strongly influenced by their evaluation of process attributes and tangible elements of a service, which then creates a halo effect (W. Jochen, 2003). In order to obtain credible measures of professional performance quality, it may be necessary to include peer reviews of both process and outcomers as these relate to service execution on the core product.

Quality Measures

Customer-defined standards and measures of service quality can be grouped into two broad categories: soft and hard. Soft measures cannot easily be observed and must be collected by talking to customers, employees or others. Based on Valarie Zeithaml and Mary Jo Bitner;

“Soft standards provide direction, guidance and feedback to employees on ways to achieve customer satisfaction and can be quantified by measuring customer perception and beliefs”. SERVQUAL is an example of soft measurement system. In contrast, hard measures are characteristics and activities that can be counted, timed, measured through audits. Such measures might include for example, how many telephone calls were abondened while the customer was on hold, how many customers have to wait in line for service delivery, how many complaints were received from the customers and etc. The challenge is to ensure that operational measures of service quality reflect customer input.

In order to measure soft measures of Service Quality, according to Leonard Berry and A. Parasuraman: “ Companies need to establish ongoing listening systems using multiple methods among different customer groups. A single service quality study is a snapshot taken at a point in time and from a particular angle. Deeper insight and more informed decision making come from continuing series of snapshots taken from various angles and through different lenses, which form the essence of systematic listening”.

Based on the statement above, the authors recommend that ongoing research be conducted through a portfolio of research approaches. Key customer-centric service quality measures include total market survey, annual survey, transactional survey, service feedback cards, focus group discussions, questionnaires, service interviews and etc.

Measuring hard measures of service quality on the other hand, typically refer to operational processes or outcomes and include such as data as uptime, service response time, failure rates, and deliveery costs. In a complex service operation, multiple measures of service quality will be recorded at many different points.

In courier service industry, FedEx was the first service company to understand the need for a firm-wide of service quality that implement all the key activities that effect customers. By publishing a single, composite index on frequent basis, senior managers hoped that all FedEx employees would work toward inproving the quality. By setting the benchmark and making it known among the employees delivers the current level of service quality delivered. Thus, the company can improve their quality of service.

Thus, within the service quality variable, the research will include the five dimensions as based on Parasuraman, which are tangibles, reliability, responsiveness, assurance and empathy. Within these dimensions, the research will identify the level of customer"s satisfaction towards the Pos laju quality of service.

Corporate image variables
Within this variable there are five dimensions that influence the customer"s awareness and customer"s satisfaction. The dimensions are awareness of the products and service that Pos Laju offers, Pos Laju employees, shareholders, brand image and advertising. Each dimension is interrelated as to form a good corporate image, thus, influence the customers.

Sustainable development definition
The concept of sustainable development has received growing recognition, but it is a new idea for many business executives. For most, the concept remains abstract and theoretical. Protecting an organization"s capital base is a well-accepted business principle. Yet organizations do not generally recognize the possibility of extending this notion to the world"s natural and human resources. If sustainable development is to achieve its potential, it must be integrated into the planning and measurement system s of business enterprises.

This definition captures the spirit of the concept as originally proposed by the World Commission on Environment and Developm ent, and recognizes that economic development must meet the needs of a business enterprise and its stakeholders. The latter include shareholders, lenders, customers, employees, suppliers and communities who are affected by the organization"s activities.

It also highlights business"s dependence on human and natural resources, in addition to physical and financial capital. It emphasizes that economic activity must not irreparably degrade or destroy these natural and human resources.

Implications for business
It has become a cliché that environmental problems are substantial, and that economic growth contributes to them . A common response is stricter environmental regulation, which often inhibits growth. The result can be a trade-off between a healthy environment on the one hand and healthy growth on the other. As a consequence, opportunities for business may be constrained.

However, there are some forms of development that are both environmentally and socially sustainable. They lead not to a trade-off but to an improved environment, together with development that does not draw down our environmental capital. This is what sustainable development is all about - a revolutionary change in the way we approach these issues.

Sustainable development is good business in it self. It creates opportunities for suppliers of „green consumers", developers of environmentally safer materials and processes, firms that invest in eco-efficiency, and those that engage themselves in social well-being. These enterprises will generally have a competitive advantage. They will earn their local community"s goodwill and see their efforts reflected in the bottom line.

Practical considerations
While business traditionally seeks precision a nd practicality as the basis for its planning efforts, sustainable development is a concept that is not amenable to simple and universal definition. It is fluid, and changes over time in response to increased information and society"s evolving priorities.

To some, sustainable development and environmental stewardship are synonymous. In the short term, sound environmental performance is probably a reasonable objective for most businesses, with sustainable development as a longer term goal. However, this can lead to confusion. In the developed

world, the focus is on environmental management, while in developing countries, rapid and sustainable development is paramount.

The global economy is coming under growing pressure to pay for the restoration of damaged environments. But this economic engine is being asked to help solve other pressing problems at the same time. The challe nge is to solve all of these problems in a sustainable manner, so as to generate continuing development.

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THE EFFECT OF ASEAN ECONOMIC COMMUNITY IN THAI GEMS AND JEWELRY INDUSTRY DEVELOPMENT

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Abstract
Thai Gems and Jewelry Industry has been ranked as one of the top worldwide manufacturing exporter from 2005-2013. Gems and Jewelry industry has allowed stable economic growth with a high employment rate. In terms of the industrial development, the industry highly relies on government and supporting industry, such as Materials, Human resources and Production technology. Along with the upcoming ASEAN Economic Community (AEC), which will become effective on 2015, subtle changes to economic, social and culture are expected. Based on these changes, AEC will impact directly to Thailand Gems and Jewelry Industry development. This research is aimed to examine the current state of the two relationships between Supporting Industry and Government to Gem and Jewelry Industry Development and compare it with the future state of the forthcoming AEC. Comparisons will be analyzed through statistical program (Statistical Package for Social Science: SPSS) in order to understand the descriptive nature of the data and a structural equation model will be proposed and validated through AMOS to verify the fitness of the model. The proposed model can be used as a guideline in making strategic decisions for Thai Gems and Jewelry Industry development toward ASEAN Economic Community (AEC).

Keywords: Gems and Jewelry Industry**,** ASEAN Economic Community, Supporting Industry, Industrial Development, Factor analysis

Introduction
Thai Gems and Jewelry Industry has been ranked as one of the top worldwide manufacturing exporter from 2005-2013.See as Table 1

Source: Department of Foreign Trade Ministry of Commerce (2013)

Industry	Value (Million)
1. Automobile parts and accessories.	707,711.9
2. Computer,Eqipment and component s.	588,398.7
3. Gems and jewelry	408,040.2
4. Oil	398,485.5
5. Rubber	270,153.8

Table 1: Shown the top 5 export value of Thailand in 2013.

Business trends of the gems and jewelry industry growth and statistics have indicated that Gems and jewelry industry is significance to Thailand economic. Gems and jewelry industry production has increased by orders from Asia because of the growing purchasing power. (Bank of Thailand, 2013) Moreover, Thai Gems and Jewelry Industry have a number of entrepreneurs and workers in related such as many mining industry, industrial design industry manufacturing and assembly industry and industrial packaging materials, etc. Thai Gems and Jewelry industry seems to have a positive economic growth due to continuous improvement in quality through technologies such as heat treatment techniques and increase in dedicated skill personnel. However, Thai Gems and Jewelry Industry have limitations on expansion. For instance, Thailand is mainly dependent on foreign raw materials because of insufficient domestic material. The technology development of design and cutting remained low compared to its competitors. Entrepreneurs do not all have equal technology in producing standardized products. As a result, gems and jewelry business in Thailand has decline in terms of quality and global image. Furthermore, with the forthcoming AEC event, the feasibility of the Thai Gem and Jewelry industry is questionable (A business analyst for Academic Unit, 2004).

ASEAN was initially established in 1967, whose initial member states namely, Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Thailand. Later on, additional four countries, namely Cambodia, Laos, Myanmar and Vietnam, also called the CLMV have also joined to become a part of ASEAN. The initial vision of the ASEAN was to promote peace in the region which will contribute to the growth of economy, society and culture, and has integration to expand cooperation and trade between each other. On 2003, the member states has agreed and introduced the ASEAN Community which is aimed to become effective by 2015. The AEC is one of the three pillars of ASEAN, the other two main pillars are ASEAN Security Community and ASEAN Socio-cultural Community and has prepared the ASEAN Charter to operate towards the ASEAN Community. The blueprint for the establishment of the AEC is provided here under (Table 2).

Source: Department of Trade Negotiations (2013)

Single Market and Production Base	Competitive Economic Region	Equitable Economic Development	Integration into the Global Economy
- Free flow of goods - Free flow of services - Free flow of investment - Freer flow of capital - Free flow of skilled labour - Priority Integration Sectors	- Competition Policy - Consumer Protection - Intellectual Property Rights - Infrastructure Development - Taxation - E-Commerce	- SME Development - ASEAN Integration	- Coherent Approach towards External Economic Relations - Enhanced participation in global supply networks

Table 2 : ASEAN Economic Community (AEC Blueprint)

Other than the Gem and Jewelry industry itself, supporting industries or industries which are related to Gen and Jewelry are important and are usually complex. It is still ambiguous and without consensus in definition. Whether “Supporting Industries” is understood broadly to include all industries that provide production inputs or narrowly as industries that provide only parts, components and tools for certain industries depends much on the user. On a practical level, Thailand defines supporting industries to be enterprises that produce parts and components that are used in the final assembly processes. For instance, Thai Gems and Jewelry Industry needs industries which produce body parts of Jewelry, Gems enhancement Industry, Gems Coating Industry, Rubber Wax and Plaster Industry. Including, Packaging Industry and Tourism Industry.

The Royal Thai Government had prepared strategic plans and development strategies and plans for the Gem and Jewelry Industry. However, lack of integration plan, lack of staff and lack of coordinated remained as one of the main obstacle. Especially in the case of a strategic overview of the country and promoting. In addition, Industrial Development also the responsibility of several agencies, both public and private. Including the Ministry of Industry Ministry of Commerce, Ministry of Interior Ministry of Finance Ministry of Science And private agencies such as the Board of Trade of Thailand. FTI Confederation involved.

Research model and Hypotheses

This study examined at the ASEAN Economic Community influencing the development of Thai Gems and Jewelry Industry with the role of supporting industries and Government supporting. And compare variance by The study of cooperation between Supporting industries and Government supporting. Based on the extant literature, the proposed relationships among 4 elements (ASEAN Economic Community, Supporting industries and Government supporting).

Supporting Industry versus Industrial Development

Gems and jewelery industry in Thailand has to import raw materials from foreign countries.In terms of production, Gems and jewelery industry be able to use modern technology to enhance the value of precious gemstone.But the technology used with semi-precious stones of the industrial enterprises

Thailand still considered a low technology level because of The restrictions on investment and technology transfer skills leads to The global market of Thailand business has not achieved (Jakkrit, 2013).

Government Supporting versus Industrial Development

Government's role in the creation of the database industry and research development. For instance assessments and industrial environments. Research taste for domestic consumption and export. Recommend consulting services to improve marketing ventures, investments and joint ventures. Business links Which is associated with the Thai gem and jewelry industry to guide the state should be a emphasize.

AEC versus Industrial Development

AEC is a chance of Gem and jewelry industry in Thailand should be expanded to more regions. As a result, obtaining benefit from the integration. In order to Thailand is the world's leading center for gems and jewelry.With the development of infrastructure and contributing to increase competitiveness (Office of Policy and Planning Ministry of the Interior, 2555) When AEC occur Thailand jewelry industry expecting. The entrepreneur can access the lower labor cost.There are chance for export to ASEAN and non-ASEAN countries.

AEC versus Government Supporting ;

For the purpose of Thai Gem and jewelry industry as a hub. Thailand government should Infrastructure development and contributing to increase competitiveness (Office of Policy and Planning. Ministry of the Interior, 2012) Therefore, it is necessary to have a government continue supporting. Because the policy is linked to industry development. Although Thai Gem and jewelry industry supported from multiple agencies. But most of government officials are still lack a deep understanding of the industry environment. AS a result, the services and programs of the various states is not achieved and cannot support the SME entrepreneurs effectively**.**

AEC versus Supporting Industry ;

Supporting Industry access to cheap raw materials from ASEAN countries. The research and development needed from ASEAN countries. Including the opportunity to hire workers with lower cost countries such as Burma, Laos, Cambodia and foreign workers, they may have the language ability workers abroad than Thailand.(Office of the National Economic and Social Development, 2012) (Quesada et al, 2012) (Academic center of Chulalongkorn University, 2014) (Patteera, 2011) The proposed relationships among Asean Economic Community, Supporting Industry, Government Supporting and Industrial Development are discussed and hypotheses related to these variables are developed as follow figure 1. Research model for Relationship of dependency between Supporting Industry and Government Supporting for Industrial Development of Thai Gem and jewelry industry in present.

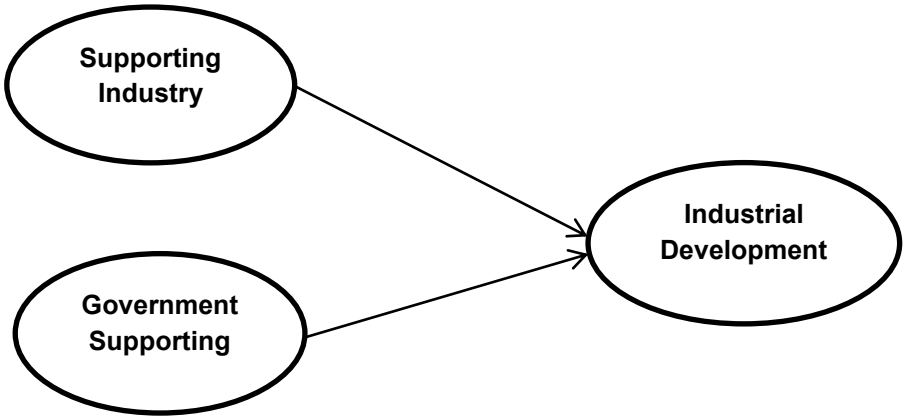

Figure 1: Research model

To understand the present of situation on dependency of Thai Gems and Jewelry Industry Development, research hypothesis was created based on the research model, which is designed to examine the causal effects of each element.(Table 3)

H_1 :	Supporting Industry has an influence in Thai Gems and Jewelry Industry development.
H_2 :	Government supporting has an influence in Thai Gems and Jewelry Industry development.

Table 3: Research Hypotheses

In addition, Research model for The Effect of Asean Economic Community in Thai Gems and Jewelry Industry Development (Figure 2)

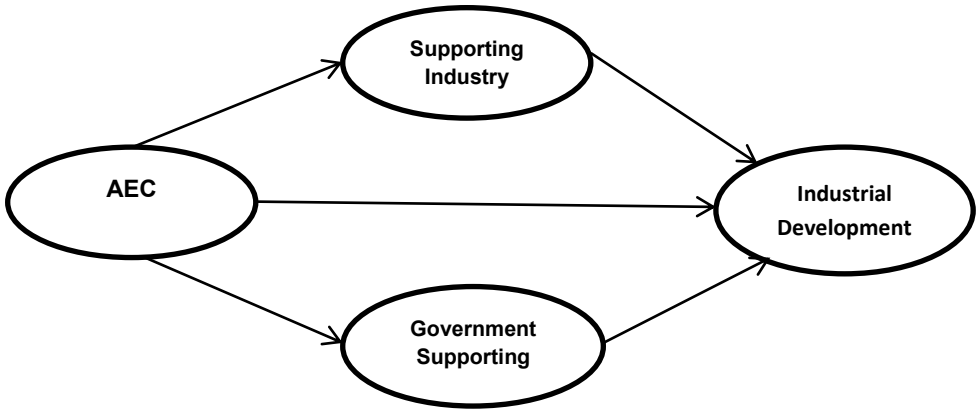

Figure 2: Research model

To understand the effect of Asean Economic Community in Thai Gems and Jewelry Industry Development, research hypothesis wrer created based on the research model, which is designed to examine the causal effects of each element.(Table 4)

H_1 :	Asean Economic Community has a motivate Supporting Industry to develop Thai Gems and Jewelry Industry.
H_2 :	Asean Economic Community has a motivate Government supporting to develop Thai Gems and Jewelry Industry.
H_3 :	Asean Economic Community has a directly motivate Thai Gems and Jewelry Industry development.
H_4 :	Supporting Industry has an influence in Thai Gems and Jewelry Industry development.
H_5 :	Government supporting have an influence in Thai Gems and Jewelry Industry development.

Table 4 Research Hypotheses

Objective

There are two objective of this research. Firstly, To analyze the relationship of dependency between industry supporting and governments in the development situation of Thailand's gems and jewelry industry in present situation. And The ASEAN Economic Community occurs. Secondly, To compare the results of dependency on Thailand’s gems and jewelry industry from government and supporting industry. Present and on into the ASEAN Economic Community.

Research methodology

Sample and data collection

The questionnaire and a letter will email to the sampled subjects. The respondents were asked to respond via email. A survey instrument was developed to investigate the impact of The Effect of Asean Economic Community in Thai Gems and Jewelry Industry Development. The questionnaire going to pre-tested several times to ensure that the wording, format, and sequencing of questions were appropriate.

Data for this study is going to collect using a self-administered questionnaire with 5 likert scale that will distribute to 2,000 SMEs entrepreneur or a senior officer/executive in charge of SCM practices. in the Manufacturing and people in government unit which involved in Thai gems jewelry industry development.

Analysis the Data

After collecting data, it going to edited to check for completeness, consistency and reliability. Afterwards, the data was transferred to the STATS. An analysis of the returned questionnaires was conducted using an SPSS computer package.

Exploring confirmatory models

There is an important difference between the factor analysis models that most statistic research analysis use and the kind estimated for a SEM. Most applications of factor analysis are “exploratory” meaning that the goal is to reveal the relationships underlying a set of variables. Exploratory factor analysis (EFA) able to use for the objective is to reduce a set of variables to a smaller, more manageable, number.

In the case of either EFA the loadings of any observed variable on any factor can assume any value. That is, which variables load on which factors is not fixed, or constrained, in any way. What is constrained is the number of factors, and often the correlations between the factors are constrained to zero. But the observed variables are allowed to load on any and all factors.(Browne, M.W. and R. Cudeck, 1993)

When using SEMs, you take an approach like confirmatory factor analysis (CFA).Then, specify which loadings and path coefficients are free to vary, and which are to be fixed at particular values. You also specify whether variables are independent of each other, or whether they co-vary. See Bollen (1989) for a more detailed discussion of the various differences between exploratory and confirmatory factor analysis.

Using Amos for structural equation modeling

SEM models can never be accepted; they can only fail to be rejected. This leads researchers to *provisionally accept* a given model. SEM researchers recognize that in most instances there are equivalent models that fit equally as well as their own provisionally accepted model. Any of these models may be “correct” because they fit the data as well as the preferred model. Researchers do their best to eliminate alternative models, and by extension alternative explanations, but this is not always possible. The use of SEM thus entails some uncertainty, particularly with cross-sectional data that are not collected under controlled conditions.

For this reason, SEM software programs require researchers to be very explicit in specifying models. While models that fit the data well can only be provisionally accepted, models that do not fit the data well can be absolutely rejected. For instance, if you fit a single factor confirmatory factor analysis model to a set of ten survey items, and the model is rejected, you can be confident that a single factor is not sufficient to explain the items’ shared variance, a useful finding, particularly if you believe that one common factor is not enough to explain the items’ shared variance. Suppose you ran a single factor model and then a dual factor model on the same set of ten items; the former model is rejected but the latter model is not rejected. Now you know that more than one factor is needed to account for the shared variance among the measured items.

In addition to evaluating the absolute goodness of fit of single models, This also can evaluate competing models by using likelihood ratio chi-square tests to compare them. Returning to the previous example, you could compare the single and dual factor models to each other using a statistical test. If that test statistic is significant, you can conclude that the more complex two factor model fits the data better than the one factor model.(Browne, M.W. and R. Cudeck,1993)

Limitations

This paper focuses on research framework, where actual data collection will begin after the completion of this paper. This paper goes through a systematic method of creating a research framework which covers ground of model validity and data reliability. The main analysis of this paper uses quantitative data collected via questionnaire. Therefore, the number of questionnaire will determine the level of validity and reliability of the result. Nevertheless, the output of this research will allow practitioners a better understanding of the importance of Asean Economic Community in and its impact on Thai Gems and Jewelry Industry Development.

Benefits/Anticipated Outcome

This paper attempts to propose a systematic model of The Effect of Asean Economic Community in Thai Gems and Jewelry Industry Development. Through the literature review, a conceptual model was presented with guidance to allow it to be measured quantitatively. The anticipated Outcome of this paper has 2 two ways. Firstly, the benefit can be measured quantitatively in the relationship of dependency between industry support. And governments in the development of Thailand's gem and jewelry industry in present and when the AEC occur. Secondly, To compare the level of dependence on responsible jewelry industry jewelry of Thailand. Furthermore, the Government and Supporting Industries which are related in Thai Gems and Jewelry Industry can use the models to create the strategies for Thai Gems and Jewelry Industry Development to obtain the benefits form Asean Economic Community. It will be useful, if the organization try to use strategies in the systematic process of development.

Acknowledgement

I take this opportunity to express my profound gratitude and deep regards to my guide Dr. Poti Chao for his exemplary guidance, monitoring and constant encouragement. The blessing, help and guidance given by him time to time shall carry me a long way of research work.Finally,I would especially like to thank my amazing family for the love, support, and constant encouragement I have gotten over the years.

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FORECASTING TRADE NETWORK OF THAILAND AND ASEAN THROUGH GRAVITY MODEL APPROACH

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Abstract
Purpose: Through the geographical characteristics, Thailand has been proclaimed as the central hub of ASEAN region. Extensive trade activities and economic prosperity are expected within the region. This study investigates the trade value of Thailand and its network to obtain benefits of the forthcoming ASEAN Economic Community (AEC).
Design/methodology/approach: This study is divided into three steps. The first step is to evaluate the trade relationship of Thailand in comparison with other ASEAN member states by using Regression Analysis. The second step is to use the past trend to forecast the future trend via Gravity Model. Finally, the result from the model of Thai trade network performance will be analysed under the context of AEC.
Findings: The study identified the possible future trend of Thailand trade network among other ASEAN member states under the content of the forthcoming AEC.
Research limitations/implications: This study uses adjusted Gravity Model to fit under the AEC content of the Thai trade network. Therefore, the model is derived from Thai trade perspective.
Originality/value: To perform the appropriate model to evaluate the future trend of ASEAN trade network with Thailand as the central pivot point. The analysis is not limited to the ASEAN member states but also to the selected developed countries.

Keywords: Trade Value, Trade Network, Forecasting, ASEAN, AEC, Gravity Model

Article Classification: Conceptual Paper

Introduction

As global supply chain plays an important role in the growth of the global economy, the definition of international trade through cross-border activities has been on a continuum of changes (Chao, 2011). The growth of the global economy is much determined by the export and import indices of a particular country. Therefore, identifications of trade flow are important in forecasting future trade trends. Exporting indices is one of the main indicators in revenue earning of a country, while the importing indices portraits the production requirements (i.e. capital goods and raw materials) and consumption capabilities. As international trade continues to evolve, a rise in trade complexity has posited challenges for shippers. Furthermore, policy clarification in between countries and government support has become a crucial factor in a country"s ability to expand its trade with others. In order to gain a whole understanding of these subject matters, Thailand was selected as the country of interest for this research. Thailand is well known for its capability of both regional and international trade. It has a high competitiveness in penetrating new markets when compared with neighbouring countries.

It can be seen from Figure 1 and Figure 2 that the trade value of Thailand with the other ASEAN member states of both export and import has increased steadily. These particular phenomena can be seen as remark of the forthcoming ASEAN Economic Community (AEC). Factorial facets of trade, whether in production base, mobility of workers and others will have an expected impact on the trade value of Thailand. The results of these studies would contribute to a fuller understanding of the current trade trend, especially for practitioners and academics.

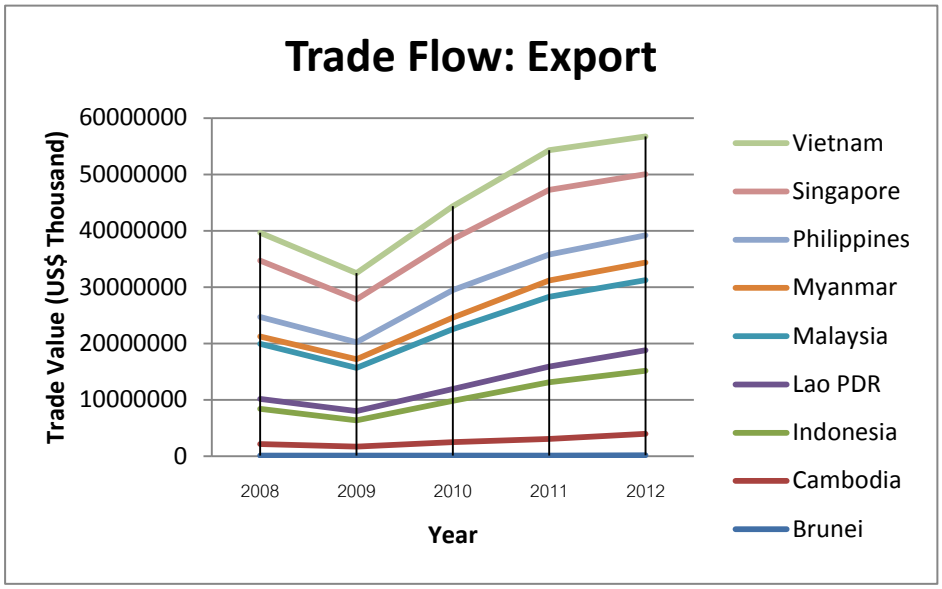

Figure 1: Thailand"s export value to ASEAN from 2008-2012; adapted from WITS (2014)

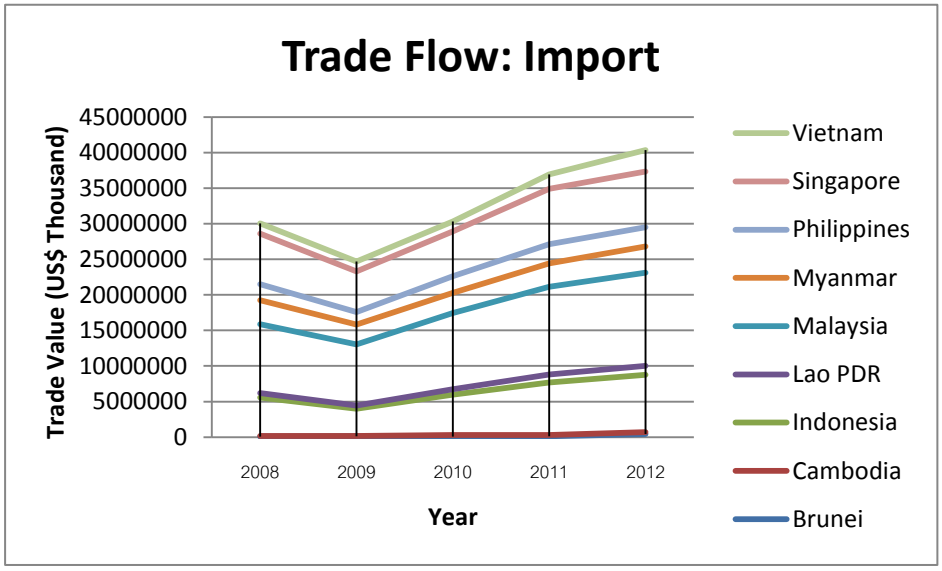

Figure 2: Thailand"s import value from ASEAN from 2008-2012; adapted from WITS (2014)

The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967 in Bangkok by the five original member countries: Indonesia, Malaysia, Philippines, Singapore, and Thailand. Brunei Darussalam joined on 8 January 1984, Vietnam on 28 July 1995, Laos and Myanmar on 23 July 1997, and Cambodia on 30 April 1999.

The ASEAN Declaration states that the aims and purposes of the Association are: (1) to accelerate the economic growth, social progress and cultural development in the region through joint endeavors in the spirit of equality and partnership in order to strengthen the foundation for a prosperous and peaceful community of Southeast Asian nations, and (2) to promote regional peace and stability through abiding respect for justice and the rule of law in the relationship among countries in the region and adherence to the principles of the United Nations Charter. In 1995, the ASEAN Heads of State and Government re-affirmed that "Cooperative peace and shared prosperity shall be the fundamental goals of ASEAN." The ASEAN Secretariat (2009)

In order prepare for the forthcoming AEC event in the end of year 2015, the ASEAN countries have prepared plans for the economic integration of different or blueprint for the establishment of an

ASEAN Community (AEC Blueprint) has four major components which are Single Market and Production Base, Competitive Economic Region, Equitable Economic Development and Integration into the Global Economic; the details of each component are in Table1.

Single Market and Production Base	Competitive Economic Region	Equitable Economic Development	Integration into the Global Economy
- Free flow of goods - Free flow of services - Free flow of investment - Freer flow of capital - Free flow of skilled labor - Priority Integration Sectors	- Competition Policy - Consumer Protection - Intellectual Property Rights - Infrastructure Development - Taxation - E-Commerce	- SME Development - ASEAN Integration	- Coherent Approach towards External Economic Relations - Enhanced participation in global supply networks

Table 1: AEC Blueprint; Department of Trade Negotiations **(**2013**)**

As the impact of the AEC blueprint, this research aim to estimate the trade value of Thailand with its trade partners. Then, identify the possibility trend to inform the involved stakeholders to preparation about the forthcoming AEC how it will impact to each sector.

Literature Review

This research aims to study the impact on trade network of Thailand and other ASEAN member states of the forthcoming AEC. This research relevant to forecasting the trade value and analyze the impact of economic integration. There are several interesting methods (Table 2). And the gravity model is more suitable with this research than other models under the condition of various variable and policy.

Econometrics Model	Researchers	Research Result
Market Share Model	Chen, Chew and Liu (1998) Clausing (2001) Liu and Luo (2004)	This model can predict the market share of the country's membership in the target market. However, this approach does not contemplate other factors that affect the market share of the country"s" membership, such as changes in technology, changes in economic policy and etc.
Price-discrimination Model	Kelegeme (1997) Winter and Chang (2002)	This model gauges the impact from economic integration that affects the price by considering to the cost of the tariffs differences among country"s membership and other countries which not membership due to the economic integration. But this method does not gauge the impact on the export and import value.
Balassa Ex-ante and Ex-post, Import Demand Function	Lalith (1998) Heien and Sims (2000)	This model gauges the impact from changes of prices and income due to the economic integration on the value and volume of imports of the country"s membership and not considering the other factors that affect to the value and volume of imports.
Gravity Model	Bergstrand (1985) Primo Braga and Fink (1999) Polder (2000) Rose (2000)	This model uses economic variables, geographic variables, and multiple policy variables to explain the impact of economic integration. And the

	Soloaga and Winters (2001) Lane and Burke (2001) Egger and Pfaffermayr (2003) Roberts (2004)	most importantly, gravity model concern about distance between countries which is a variable that reflects the logistics cost and international transportation cost too.

Table 2: Review of the research result of each model

Research Objective
To perform the appropriate model in forecasting the trade value and also trade network between Thailand and other ASEAN member states. To analyzes the trend changing of trade network on the forthcoming AEC.

Research Methodology
This study uses trade historical data to collect the empirical data. The first step is to evaluate the trade relationship of Thailand in comparison with other ASEAN member states by using Regression Analysis as an estimate method. The second step is to use the past trend to forecast the future trend via Gravity Model. Finally, the result from the model of Thai trade network performance will be analysed under the context of AEC.

Regression Model
This purpose of this research is to estimate the target-year trade value by export and import for each partner within the region. Because Regression is a statistical measure that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables.
The Regression Model can be employed in connection with trade value. The selection of the most appropriate form in a particular case is usually based on experience and preliminary investigations into the matter. (Papacostas and Prevedouros 1993). This study uses the linear multiple-regression model, which has the form

$$Y = a_0 + a_1X_1 + \ldots + a_rX_r$$

Where *Y* is the dependent variable, the *X*"s are the relevant independent or explanatory variables, and the *a*"s are the parameters of the model that must be estimated prior to applying the model
The output from this model is the simple correlation of the trade behavior of Thailand and other ASEAN member states.

Gravity Model
The gravity model gets its name from the fact that it is conceptually based on Newton"s law of gravitation. (Papacostas and Prevedouros 1993) The gravity model is a well-known econometric model that is often adopts to model flows from various kinds. The flow is regarded as the resultant of the attraction between two objects. The attraction is positively related to the masses of the objects: the attraction among two objects with a larger mass is higher than among two objects with a smaller mass. On the other hand, the mutual distance of the two objects decreases the attraction; when objects are farther away from each other, the mutual attraction is smaller. It is also similar to the trade value; the attraction among two countries with a large size of economic has gravitation more than among two countries with a small size of economic.

When the flow concern international trade, Polder M. (2000) stated that the objects are exporting and importing countries. The „masses' of the countries are size of their economics, from which a certain potential trade flow result. The larger economies of the concerning countries, the larger the trade among these countries will be. However, the mutual distance causes a resistance to trade, because of transport costs and time, among other things. Additional trade hampering factors are import tariffs, border controls, quantity restrictions and etc. these are indirect or artificial transport costs that are not related to distance, but more to the mere fact that the goods are transported from one country to another.

The grvity model is represented in Figure 3. It can be seen that form the sizes of economies of the exporting country and importing country, respectively a potential supply and a potential demand arises. This leads to a potential trade flow between the countries. This flow is subject to certain trade resistance factors. Trade resistance at its turn is lessened by trade arrangements, which in general

concern arrangements with respect to the artificial transport costs. Finally, the actual trade flow results.
The mathematical expression as the following model:

$$X_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} N_i^{\beta_3} N_j^{\beta_4} D_{ij}^{\beta_5} A_{ij}^{\beta_6} u_{ij}$$

where

X_{ij}	=	export/import value from i to j
Y_i . Y_j	=	the gross domestic product (GDP) of countries i and j
N_i , N_j	=	the population size of countries i and j
D_{ij}	=	the distance between countries i and j
A_{ij}	=	trade arrangement dummy
U_{ij}	=	error term

The above equation can be expressed in terms of log-linear as follows:

$$lnX_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnN_i + \beta_4 lnN_j + \beta_5 lnD_{ij} + \beta_6 lnA_{ij} + u_{ij}$$

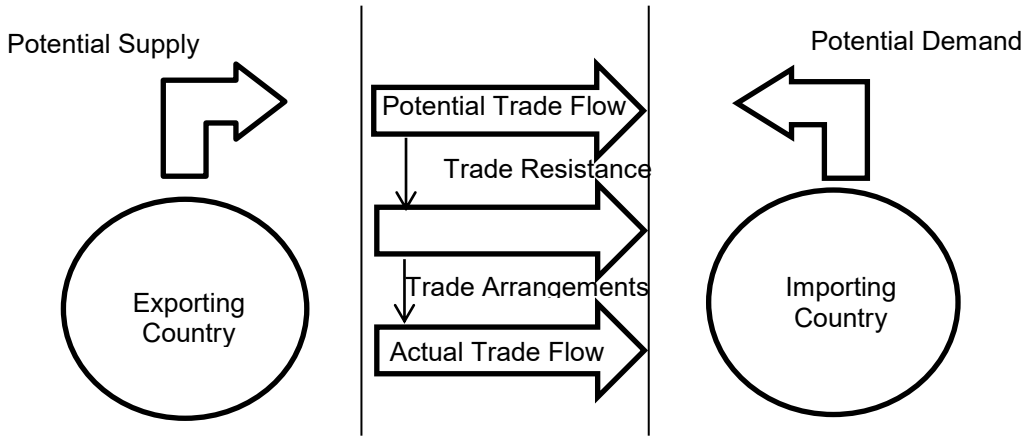

Figure 3: Graphical representation of the gravity model; Polder (2000)

Benefits/Anticipated Outcome
To perceive the current trade network between Thailand and other ASEAN member states. And also comprehend the trend of trade value between Thailand and the country's trading partners which are ASEAN member states in any directions along with the trend changing between Thailand and other ASEAN member states on economic integration on forthcoming AEC in the end of 2015. In order to guide for oriented into the AEC integration under the content of AEC blueprint.

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THE POSSIBILITY OF INTRODUCING HALAL SYSTEM INTO JAPAN

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ABSTRACT

Purpose: The propriety is verified about the possibility of introduction of the concept of a Halal system in Japan. Simultaneously, the subject and solution in the case of introducing are explored.

Design/methodology/approach: The measure for Halal in Japan has just started. Based on interviews to the enterprises those who got Halal certificate recently, a trend is clarified about the measure for Halal in Japan There is extremely little export value of the food from Japan to the Islamic area compared with other countries. if export increase of the food in the Islamic area, it is both Japanese government and enterprises wish, will be expected from now on, introduction of a Halal system will not be avoided. Introduction of Halal system is promoted also when the demand from the Islamic countries which are the countries of consumption becomes strong.

Findings: From now on, the demand of Halal certificate acquisition will increase in Japan. There are problems to solve to fix Halal system in Japan. The difference of the recognition to the Halal between Islamic countries, also there is a problem of unification of a Halal certificate authority or an certification standard.

Originality/value: In Japan, Halal correspondence has just started. The directivity of Halal of Japan was shown.

Keywords: Halal, Muslim, Halal certification, Halal Chain, Halal Logistics

Paper type: Research paper

Introduction

Islamic population is about 1,900 million people equivalent to 27% of the world in 2011. One billion people who amount to the 60% live in Asia. The Halal market is increasingly expanded by improvement in people's income, and diversification of eating habits including Indonesia which has the greatest population in Islam. US$3.3 trillion is said in a meaning called the Halal market. Japan is behind the West, South Korea, and China greatly by Halal correspondence.

The tourist from the Islamic area, such as Malaysia and Indonesia, increased rapidly against the background of the requirements for issuance of the visa having been eased last year. Moreover, Tokyo Olympics are planned in 2020 and it is expected that it increases in number increasingly from the Islamic area.

Against the background of such a situation, since last year, concern about Halal is increasing.
Not only International Airport, such as Narita (NRT) ,Kansai International Airport (KIX) but also University, like Kyoto University, Ritsumeikan University, Okayama University, Kanazawa University, the University of Tokyo, Tohoku University, Nagoya University, Hokkaido University, Tokyo Institute of Technology prepare Halal menu at canteen.

Muslim correspondence is hurried in Kansai International Airport. Specifically, it is Halal correspondence of installation of a prayer room, and a meal. The catering company for the in-flight meals of an international airline who has Halal kitchen, provide Halal dishes for group tour. Also some restaurants serve Halal food in Kansai International Airport.

Export of the food and the drink for Southeast Asia from Japan is less than 1% of total exports, and there is compared with other export items extremely little. Japan thinks to lengthen export of food. The correspondence to Halal cannot be bypassed for access to Southeast Asia or the Middle East market which are the promising export destination. The correspondence to Halal is a passport of the business in the Islamic market. To access to the Islamic market where expansion will be expected from now on, Halal correspondence is indispensable. Concern about Halal is increasing against the background of such a situation even in Japan. On the other hand, in an Islamic market, a Halal

certification system is spreading centering on Malaysia. In this paper, it verified based on the interview to companies about whether a Halal certification system is introduced and established in Japan.

The concept of Halal

What was processed in conformity with the law of the Sharia (Shari'ah) method is called Halal. The other thing is called Haram or Non-Halal. Halal shows food, cosmetics, etc. which were produced without using pork, alcohol, etc. which Islam forbids. Even if it is beef and chicken, they have to be processed according to the Islamic rule. Moreover, in the all the whole processes of materials, a production line, storage, transportation, display, and sale, in other word through supply chain, the thing of Non- Halal and physical separation are required.

In recent years, Kansai International Airport (KIX), which is concentrating into Halal correspondence, explains Halal as follows.

"Halal is Arabian of the meaning of being lawful, in Sharia, and refers to what a Muslim can eat satisfactorily about food. Generally it is required to carry out the contraindications of a pig, alcohol, and its derivative, and to be processed according to Sharia also about the other foods, and it is also forbidden that Halal food and the other food contact." (Extract from KIX News Release 2013.8.13)

There is a certification system in Halal in each country, and if certified, Halal logo can be used. A Halal certification system is the structure similar to the certification system of ISO. The ISO guarantees it a process in comparison with being the system that JAS (Japanese Agricultural Standard) and JIS (Japanese Industrial Standards) guarantee product itself. t is basics in the ISO that, as a result, guarantee a product by guaranteeing a process. The process is also important for Halal certification. Moreover, also not only in goods but the point of certificating also to service, management, etc., it is close to the way of thinking of ISO.

Material	- Materials including feed must be only in Halal. - The derivative of pork cannot be used. Lard→ Emulsifier seasonings (dairy products, a milk beverage, etc.) Pig hide→ Gelatin (jelly, yogurt, etc.), Collagen (a supplement, cosmetics, etc.) Internal Organ→Enzyme (use by a food manufacturing process, medical supplies, etc.)
Processing	- The Muslim who attested performs meat production.
Transportation	- Use car exclusive for Halal Food (contamination with non-Halal food is impossible).
Cooking	- Use Halal Kitchen, exclusive use for Halal Food only Alcoholic disinfection of cookware etc. is not allowed.
Sale	- Isolate from non-Halal food and sell. - Distinguish a cart from non-Halal food.

Table 1: The main rules for accepting as Halal

Source: Masayuki Yamauchi, Reiko Okawa, "Islam basic exercise book" Yamato Shobo（2013）

Halal Market

It is said that there are US$3,200 billion (about JPY320 trillion) of markets of the whole Halal. There are foods, cosmetics and medical supplies are US$ 2,200 billion (about JPY220 trillion) in the whole. The food in which it is interested is US$650 billion (about JPY65 trillion), and cosmetics, a personal care article, and leather goods are US$700 billion (about JPY70 trillion). In addition, there are US$1 trillion (about JPY100 trillion) in service industries in connection with the eating-and-drinking relation in a hotel or catering, and certification acquisition, such as consulting, finance and circulation. The 63% is a market of Asia.

	Industrial	Market Size
Product （US$2.2 trillion ）	Foods	US$650 billion
	Medical supplies	US$850 billion
	Other Products (Cosmetic, A personal care article, leather goods, etc.)	US$700 billion
Service （US$1 trillion ）	Food (hotel catering), certification, consulting and training, finance, media, logistics, sightseeing	US$1 trillion

Table 2: Halal Market Size
Source: Data created by Japan Halal Association, ”Halal administrator Session” etc.

The percentage of food in the export to ASEAN countries from Japan in all the export items is less than 1%. Also in the countries in which Japanese companies including Malaysia and Indonesia, have an overwhelming share, export of food is almost nothing. For the background, it is certain that Halal is one of the major factors.

The food market in Japan is US$342,600 million in1991 (JPY34,260 billion) and US$340,700 million JPY(34,070 billion) in 2012, and has been in a stagnant situation for 20 years or more. The Islamic food market is already US$6,500-7,000 billion (JPY65-70 trillion). This is a twice as many scale as the food market in Japan. For Japan's food industry, an Islamic market is the area which has a big possibility. For the food and the drink export expansion to these areas, Halal correspondence is indispensable.

unit: Billion US$

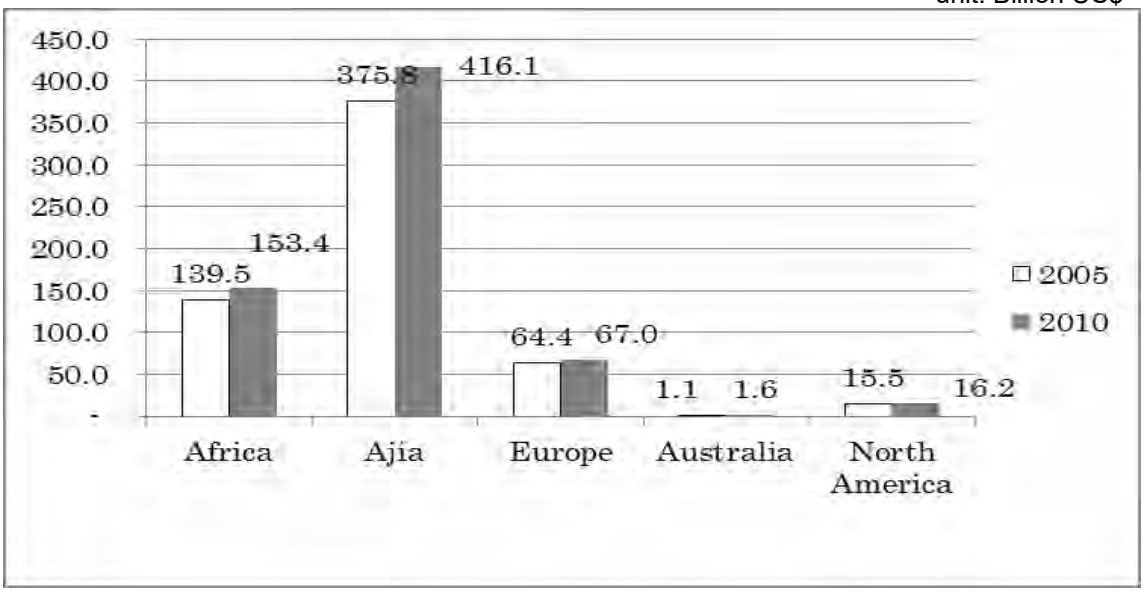

Figure 1: Halal food market in the world
Source: Executive Review of World Halal Forum Europe 2009 etc.

Unit: : million US$

	Food/Drink		Whole Items
	Export	Share in whole items	Export
Thailand	216	0.62%	34,905
Singapore	133	0.72%	18,603
Malaysia	43	0.31%	14,129
Philippines	34	0.36%	9,458
Indonesia	31	0.20%	16,191
5 countries Total	459	0.49%	93,288

Table 3: Export of Food/Drink to ASEAN from Japan（2012）
Source：Ryoichi Namikawa, ”Introduction to Halal Food Market” Japan Food Journal（2013）

Halal Certification system

The Halal certification system is expanded led by Malaysia. JAKIM which bears Halal certification of Malaysia has tied up with 33 nations and 57 organizations. It seems that global standardization of Malaysia Halal is successful. The certification of JAKIM is stricter than that of other countries. Therefore, JAKIM is trusted from Islamic countries. Saudi Arabia is the severest country to Halal. it is said that all the meat imported is inspected by the national organization, it puts into practice. However, Halal is not stipulated as a system. That is, in Saudi Arabia, all people are Muslims and people's life is led by the premise that all the things in the country are Halal. On the other hand, a Muslim is about 60% in Malaysia. There are also people other than a Muslim and the thing of Halal, and Non- Halal is intermingled in the country. Therefore, the system where Halal food can be recognized easily is required. It has such a background that a Halal certification system is being established in the country of Asia, such as not countries in the Middle East but Malaysia and Indonesia. The strictness of Halal does not necessarily accord with the introduction and establishment of a Halal certification system. The processed food is increasing and they are imported from all the country and areas in the world today. It serves as a backdrop to the move towards a Halal certification system that it is hard to attach distinction of Halal or Non-Halal only by glancing.

Brunei was made for meat imports to impose a duty of Halal certification upon all from April, 2014. Thus, the motion which strengthens Halal certification acquisition in Islamic countries has come out. Figure2 expresses the relation between the height of the degree of demand to a Halal certification system, and the penetrance to the society of Halal according to a country. The figure shows that the high penetrance to the society of the Halal and the high demand degree of the Halal certification do not necessarily accord. Malaysia extracts a group and that of the demand in Halal certification is high. However, Muslim population is 60% of the whole country, and Halal has not necessarily permeated as a society as a whole. On the other hand, although Saudi Arabia is said to Halal as the severest country, it does not have what was codified out about a Halal certification system, and the measure for a certification system is not progressing.

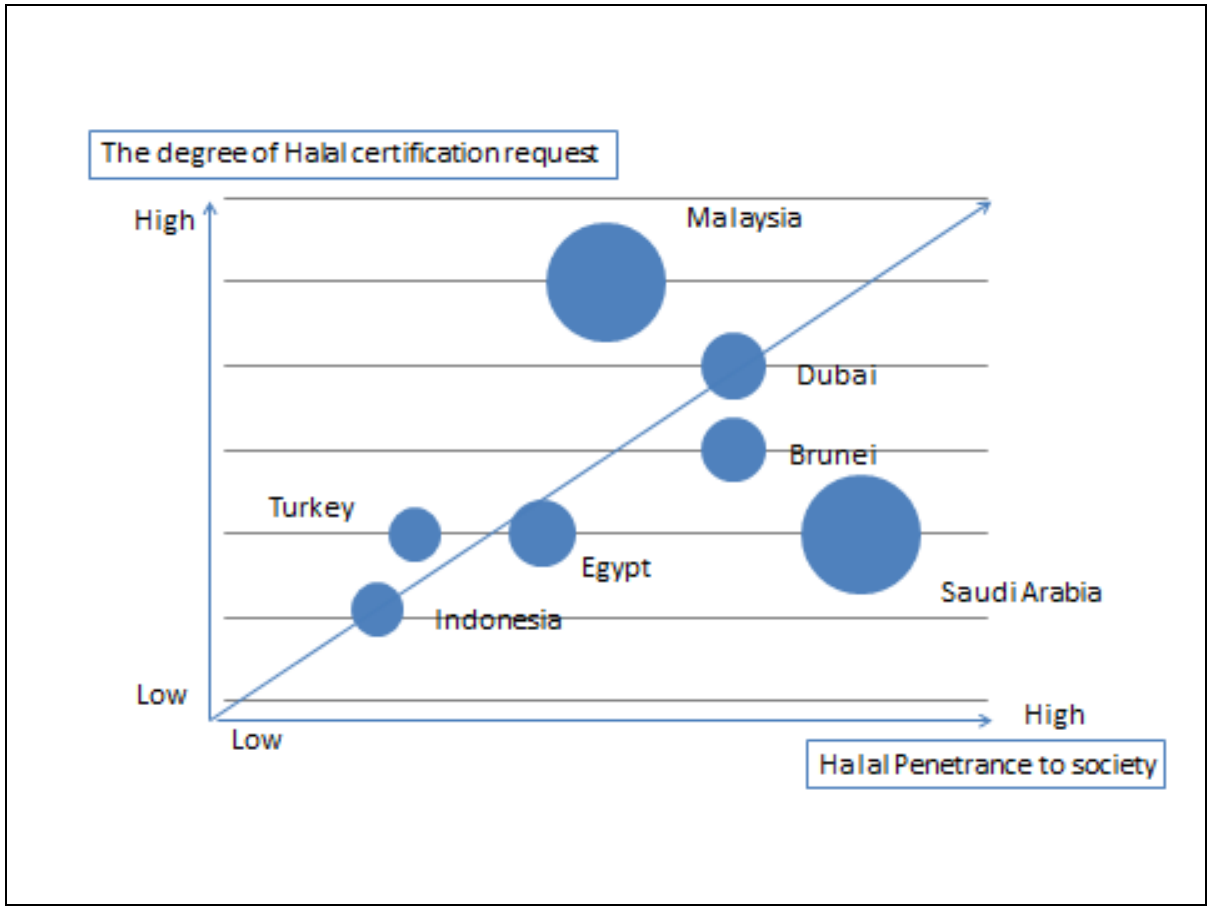

Figure 2: Height of demand of Halal certification of main Islamic nations. Note: It is based on an author's feeling. In the graph, bubble shows only a position, The size is not related.

Country	Certificate Authority/Organization
Malaysia	Jabatan Kemajuan Islam Malaysia（JAKIM）
Singapore	The Majlis Ugama Islam Singapura（MUIS）
Indonesia	Majelis Ulama Indonesia（MUI）
Thailand	CICOT（The Central Islamic Committee of Thailand ）
USA	IFANCA（The Islamic Food and Nutrition Council of America ）

Table 4: Halal certificate authority/Organization

The present condition of the measure for Halal in Japan

Until now, the Japanese company corresponding to Halal was restricted very much. The major companies, such as a Kewpie, Ajinomoto, Taisho Pharmaceutical, POKKA, and Kao, were in the mainstream. The opportunity to recently see that movement toward Halal certification acquisition is reported by the newspaper etc. mainly by a food producer even in Japan increased. The point which should be noted here is that concern of small and medium-sized enterprises is increasing. It is because Halal certification is required because of export to Islamic countries. A major manufacturer starts a factory to Malaysia, Indonesia, etc. at the Islamic area, and exports to an Islamic market from there. On the other hand, small and medium-sized enterprises are trying export to the direct Islamic area for what was produced at the domestic factory in many cases.

For that purpose, it is necessary to acquire Halal certification in Japan. Hikari Miso which developed the bean paste not using alcohol, the Global Field which aims at export of the native chicken "Aomori Syamorock" of the Aomori brand, etc. are mentioned. Moreover, Nishio Milling and Shiono Koryo are mentioned as a company which acquires Halal certification at the request from an importer also in the company which is already exporting. Nishio Milling is exporting wheat to Singapore. Nishio Milling was asked for Halal certification acquisition by Importer for the market expansion to Malaysia etc. Shiono Koryo supplies spice materials to the joint corporation in Taiwan. It is exported to the Islamic area via Singapore from Taiwan. Therefore, an importer asked for Halal certification to Shiono Koryo which is a vendor of materials.

When the income in Islamic countries, such as Malaysia, improved, the demand of Japanese products, such as spice and high-quality wheat, is increasing, and the business opportunity has swollen for the Japanese food-related company. The cases where Halal certification acquisition is requested from a market by expanding from an import side are increasing. Furthermore, not only a product but the thing been under pressure also to logistics companies, such as transportation and storage, in the future can be imagined easily. Although there is also an example which is beginning to move by Malaysia concretely towards Halal certification acquisition like Nippon Express in a Japanese logistics company, it is still exceptional. However, although it does not appear in concrete action, interest is shown in Halal, and there are few logistics companies of having begun research. Halal certification cannot be bypassed in business with Islamic countries. And it is the problems of all the companies in connection with the whole supply chain including not only Manufacturing industry but a logistics company.

Name of company（Place）	Certified organization（Certified year）	Remarks
Hikari Bean paste（Nagano）	Japan Halal Association（2012）	The bean paste which is not using Alcohol is developed. The first certification acquisition in the bean paste industry. It exports to Southeast Asia.
Nansatsu Shokucho（Kagoshima）	Japan Asia Halal Association（2011）	Export of the chicken for Islamic markets.
Kato Confectionery（Aichi）	Japan Asia Halal Association（2013）	Certified Confectionery sells Takashimaya in Singapore.
Nishio Milling（Aichi）	Japan Halal Association（2012）	Flour is exported to Singapore. It exports to Malaysia via Singapore.
Shiono Spice（Osaka）	Japan Halal Association（2013）	Spice materials are exported to Singapore through the joint corporation in Taiwan.

Global Field (Aomori)	Sendai Islam Culture Center（2010）、Japan Islam Culture Center（2013）	Cerification 2010, chicken. 2013 meat and vegetable dumplings, a cheesecake, a peach, a gizzard, and smoked chicken. For domestic Muslims and export are also put into a view. For domestic Muslims and export are also put into a view.
Inoue Spice Kogyo （saitama）	Japan Asia Halal Association	Sale of the curry roux corresponding to halal.
Ninomiya(Tokyo)	Japan Muslim Association	Halal special food trading company. Import of the foods of ASEAN countries. Manufacture of the bread corresponding to the halal in a captive factory. Processing of frozen meat. Halal lunch, the catering service for parties, etc.
Osama Seika(Tokyo)	Japan Asia Halal Association	Hail Confectionery(Red pepper, dried seaweed)
Zenkai Meat(Kumamoto)	MUI(2011)	Exporting beef to Indonesia

Table 5: Samples of companies who got Halal certification in Japan
Source: Data created based on the various report and web site etc.

The financial institution also shows the posture which supports a Halal certification acquiring companies so that it may be seen by Mitsubishi UFJ Bank (Nikkei newspaper 2014.2.24). To the company which deals with the product suitable for Sharia, or service The extracted "Halal fund" is born (Nikkei newspaper 2014.4.11).

The height of the measure to Halal and an interest level has a big difference by a type of industry in Japan.In the manufacturing industries, such as food, concern is high. One of the features of the company which actually acquired Halal certification has a case of the request from an importer like Nishio Milling or Shiono Koryo. Next, there are service industries, such as an airport, a hotel, and a restaurant, as a high type of industry of concern. It is what the increase in the tourists from the Islamic area is expected for. The logistics industry including a track is the less interested.

The answer that it was uninterested about Halal and there was no knowledge as a result of the interview to the manager of about ten logistics companies about the interest level of Halal was more than half. Even when saying that it knows about Halal, there is no action and will to Halal. It is the greatest reason that cost starts too much. It is Nippon Express that is doing the uniquely concrete measure by the Japanese logistics company. The overseas subsidiary of Malaysia is during the application of the Halal certification to JAKIM, and Nippon Express is soon called certification acquisition hope. It seems that Nippon Express considered Halal certification in the air cargo at Narita Airport. However, according to Japan Halal Association, which has tied up with JAKIM, at a present stage, environment is not ready so that the Halal certification acquisition in Japan in a transportation section is difficult. Although there was no plan, NYK logistics, started research about the Halal certification system for the time being.

For the moment, the example of the Halal certification about a logistics does not still have one affair in Japan, either.

Figure 1: The Muslim employee who works at a GLOBAL FIELD processing plant
Photo by Author

Figure 2: It is kept in the materials complement place in the charge factory of, and the place classified only into Halal (Shiono spice).Photo by Author

The possibility and its subject of the Halal system introduction in Japan
Four are mentioned as a subject about Halal.

The first, Halal is religion, so it is not forced, and should eventually be left to an individual, and there is a difference also in the correspondence by a country. For example, drinking Alcohol is common in Turkey. Ko Nakata, Islamic scholar, had said, “I think that it is a major offense equal to taking the real power of God to force to prove Halal.” (Uchida/ Nakata, ” Monotheism and a state”, Shuueisha , 2014).

The Second, the degree of demand of Halal has a big difference by a country. JAKIM of Malaysia is in charge of certification, in very severe. Through all the process including transportation and storage, it is demanding complete separation with Non-Halal, etc. The correspondence like as Malaysia is difficult for Japan in which Muslim population about only 100,000. If such talks are made the manager of a track company, the reply "unreasonableness" will actually come on the contrary immediately.
Realistic correspondence is a subject.

The Third, Many organizations have issued certification, and the screening criterion is not unified, it is ambiguous in Japan. Even if a screening criterion is too severe, it is not realistic, but even if too loose, there is a risk of trust being lost internationally. In case a state organization attests like Malaysia, and public institutions, such as NPO, may play the role. Generally, there are many latter examples. In the case where a government organization and a public institution attest, one organization generalizes certification like JAKIM in Malaysia, MUI in Singapore, MUIS in Indonesia. In Japan, if an organization which generalizes a certificate authority is not made, this problem is not solved. For that purpose, a

method only has that the government plays the role of adjustment. However, there are no signs that concern moves the government thinly about Halal now.

The fourth, there is a peculiar problem of Japan that Muslim population is small. The Muslims who live in Japan now are about 100,000. Even if it includes a tourist, the demand to Halal is small, and the big cost for Halal correspondence starts.

Conclusion

Halal products, such as food, and cosmetics, etc. to Islamic countries, are expected increased. The Halal certification system currently promoted by Malaysia is becoming common in the Islamic area, and is becoming the global standard. Against the background of such a situation, it is thought that the movement toward Halal certification acquisition is accelerated in Japan. There was much contrary of the spot in the introductory early stages of the system of ISO. Now, it became natural to carry out certification acquisition of ISO. It is thought that a Halal certification system will also become a thing indispensable to dealings with the Islamic area in the future. However, for the moment, as for the movement toward Halal certification, the manufacturing industries such as food, and a hotel and a restaurant are restricted in part. There is almost no motion in the logistics field. Thus, the Halal certification system in Japan has just started now. The range is still food and a narrow range restricted to the service industry in part.

In Japan, time is still required for a Halal certification system to spread. In the following case, a possibility that the measure for Halal will be quickly expanded in the logistics field in Japan will be restricted.

It is a case where there is a strong request to logistics contractor from the manufacturing industry which having a pressure from the importer side, and a shipper.

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IMPROVEMENT OF USED SHOES SUPPLY CHAIN BY REVERSE LOGISTICS AND LEAN CONCEPTS

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ABSTRACT

Purpose: To review and investigate the value chain of used shoes in Thailand, and to propose a framework for improvement.

Design/methodology/approach: The methodology of this study is divided into four steps. Firstly, used shoes supply chain in Thailand is surveyed and reviewed. Its value chain is then analyzed whose added values in the chain are identified. Subsequently, value stream mapping (VSM) is employed to define and analyze the supply chain processes where unnecessary activities are discovered. Finally, an improvement framework based on reverse logistics and lean concepts where procedures in the chain are adjusted is proposed.

Findings: Conditions and procedures of Thailand's used shoes supply chain are overviewed. Present activities which are either value added, necessary but non-value added, and non-value added are identified. Supply chain of used shoes in Thailand can be improved using simple industrial management concepts.

Research limitations/implications (if applicable)**:** In this study, data collection is performed using observation and interview approach only at Rong Kluea Market. There is no previous study regarding used shoes supply chain.

Practical implications (if applicable)**:** This study can be used as a guideline for entrepreneurs to adjust their procedures in order to reduce cost and time as well as to increase customer satisfaction. Moreover, the techniques adopted here in this work should be practical to other recycled products.

Originality/value: Supply chain of used shoes is considered for the first time, especially in Thailand setting. The case study is extremely useful for other recycled products.

Keywords: Shoes industrial, Used Shoes Supply Chain, Rong Kluea Market, Sakaeo

Introduction

In any declining economy, spending habits of consumers are changing. The consumers will tend to spend more carefully. Consumers may look towards second hand markets. Second hand market is the market of choice to help consumers save their money. It is the place where people will sell used goods such as clothes, bags, accessories, books, decorations and etc. Used goods are popular if they are generally in good quality and low price. Nowadays, this term of retail is accepted and shows signs of expansion. In Thailand, there are many second hand markets, for example; Chatuchak market, Wang Lang market, Klong Thom market, Train market Srinakarin etc. One of the biggest second hand markets in Thailand is Rong Kluea market located in Sakaeo near Thai-Cambodia border approximately 360 km from Bangkok. This market is popular for Thai people, tourists and sellers. Rong Kluea market can be considered a retailer and wholesaler.

There are several materials and processes involved which are driving the production process for sandals and specialized shoes. Therefore, in terms of operational activities, they might be different. This industry is growing. The demands and the competitors of these products are increasing. The product cycle is relatively short. With the rapid changes in market place and fashion, consumer trends might lead to a higher level of post-consumer waste. Worn and discarded (end-of-life) shoes are disposed of, despite their remaining market values.

In Thailand, there are imported used shoes from others countries through Laemchabang port located in Southern Bangkok which are forwarded to Rong Kluea Market for reselling. The process flow of the selling chain is of great interest. The middlemen who import used shoes sell them to merchants in Dech Thai market (Sub-market of Rong Kluea market). The merchants are classified into 3 groups by grade and price of products that they selected. Used shoes are put into the processes following; separating, selecting, washing, repairing and coloring. Subsequently, the shoes are resold with retail and wholesale price. Generally, all products in this chain are used shoes and consumers are interested in buying them, because they contain brand name which have lower prices than new shoes.

This study focuses on reviewing used shoes supply chain for analysis of the value chain and processes. Value added of used shoes was investigated. The processes will be analyzed and defined using Value Stream Mapping (VSM) to reduce unnecessary activities. Finally, improvement based on reverse logistics and lean concepts are suggested to minimize supply chain cost.

Literature Reviews

There have been very few studies on the used shoes supply chain, hence the reason for this study. The scope of this paper is related to the review of the used shoes supply chain and to understand the value added in the chain by means of value chain analysis.

The previous studies are reviewed in 3 main categories. Firstly, this study will look at a review recovery process in the chain (Why this process is important in chain). After, value strategies are described. Lastly, this research will look at the footwear industry.

This section aims to describe some of the key concepts in understanding why the business organizations are interested in recovery products. In addition, how companies add value to their products. Finally, waste management in the footwear industry is analyzed.

End-of-life Strategies

Previous studies have reported that several business organizations are concerned about the environmental impact of the products during the final disposal process. Businesses attempt to create appropriate procedure to reduce waste at products' end-of-life cycle. Pigosso, et al. (2010) introduced eco-design concept which focused on remanufacturing. They concentrated on products' end-of-life as a part of product life cycle. The End-of-life strategy includes processes such as; reuse, repair, refurbishment/reconditioning, remanufacture and recycling. This concept tries to close the loop, minimizing environmental impact and cost of life cycle manufacturing processes. The following definitions for these terms are used in this study:

Reuse is process of used materials, products or components by second customer without prior repairing or as originally designed (Rathore, et al., 2011).

Repair is the process of bringing damaged components or items back to a functional condition (Rathore, et al., 2011).

Refurbishing/Reconditioning is the process of retrieving components to a functional state to the original specification. For example: repainting, reconstruction and etc. (Rathore, et al., 2011).

Remanufacturing is the process collecting used products or components, assessing its condition, and replace worn, broken or obsolete parts with new or refurbished part (Pigosso, et al., 2010)

Recycling is the process taking used products, components and materials to fieldstrip, separate into categories and processing them to make the same material or useful degraded material (Pigosso, et al., 2010; Rathore, et al., 2011).

Nowadays, numerous business organizations intend to follow up the End-of-life strategies, because they believe it can reduce their business cost and waste in processes. Moreover, it can help to decrease environmental impact. Therefore, they try to add value to the recovery products and

complete processes in short time. End-of-life strategies use in many businesses extensively especially in electronic equipment, automobile industries, mobile phone industries, returnable packaging etc. For example, Subramoniam et al., (2010) presented an aftermarket remanufacturing strategic planning decision-making framework where the survey were conducted in 3 target groups of automotive aftermarket. The survey samples were Original Equipment (OE), Original Equipment Service (OES) and Independent Aftermarket (IAM). End-of-life strategies of mobile phones are studied in many areas such as India, Hong Kong and United Kingdom (Rathore, et al., 2011; Chan and Chan, 2008; Canning, 2006; Geyer and Blass, 2010). During the research carried out on mobile phones reuse and recycling, the authors surveyed supply chain components, market structure and economy scale of these products. In addition, they focus on product life cycle of a typical mobile phone. Lastly, they show how mobile phones currently move through the value chain and the important of recovery markets in this moment. Returnable packaging model may be modified from disposable packaging. Silva, et al., (2012) presented a case study on the reverse flow of returnable packaging to replace a disposable packaging. They followed in three steps. Firstly, reverse logistics flow mapping was shown. Technical analysis was then used to define the type of returnable package. A technical analysis was used to compare unit cost with returnable packaging and disposable packaging. Finally, Life Cycle Assessment (LCA) technique, ISO 14040 standard series was adopted to correlate model of returnable and disposable packaging in term of environmental impacts.

It can be seen that majority of previous studies focused on electric industries which adopted concept of End-of-life strategies to their business. There is hardly any studies, investigating in second hand products. This study is interested in reuse, recycle, repair and refurbish of used shoes supply chain. Therefore, previous research will implement this chain.

Value Chain Strategy

At present, there are a number of highly competitive businesses. Therefore, several organizations attempt to create value in their chain. Generally, value chain is a strategy that they used for analyzing their chain from the beginning. Value Chain focuses on processes, and how inputs are changed into the outputs purchased by consumers (Porter,1985). After analysis of the value chain, companies will know added value in the chain and how they operate. Elements in Porter's value chain are divided into primary and support activities. Primary activities are inbound logistics, operations, outbound logistics and marketing/sales. Support activities are secondary activities and can drive a role in primary activities. So, there are procurement (purchasing), human resource management, technological development and infrastructure. Walters and Lancaster, (2000) reported that several businesses have value chain process in details more than porter's model, such as The bluegum group, automotive industry, The Mckesson Corrporation, The Caterpillar and The freedom furniture. Each of them has some differences in the model. Customers today have more selection of products and services than ever before, but they are not entirely satisfied (Prahalad and Ramaswamy, 2004). The concept of co-creation is presented to combine the firm, the market and the consumer together. In 2004, Prahalad and Ramaswamy, compared concept with no co-creation and co-creation. Co-creation increases interaction between the firm, the market and the consumer. For example, they are joint problem definition and problem solving. For this reason, this concept creates experience variety and then aggregate into one idea. Problems may be resolved directly according to the customers need. As a consequence, co-creation is an interesting practice in value creation. Value chain is not specified for the business chain. It can be used to analyze network value by defining value linkages of players in the network (Peppard and Rylander, 2006). Fashion industry is an interesting sector because it has rapid change with demand driven. Fashion supply chain concerns on lead times, time to market, time to serve and react. Today, fashion market is extremely competitive and need to modernize product all the times. So, if they can shift into an agile supply chain and can forecast the demand, their cost will reduce (Christopher, et al., 2004).

Value Stream Mapping (VSM) is a tool for reviewing the overall processes. Start from creation of current state mapping. Analysis and defining processes are then sorted into three categories; non-value adding (NVA), necessary but non-value adding (NNVA) and value-adding (VA). Subsequently, procedure is created to eliminate seven wastes in systems which are overproduction, waiting, transport, inappropriate processing, unnecessary inventory, unnecessary motion and defects. Finally, creation of future state mapping is performed to adjust process. The expected result includes

minimizing time and cost in chain (Hines and Rich, 1997). The VSM concept is considered as a significant tool in the improvement stage of this research.

Waste Management in Footwear Industry

The footwear industry is part of the overall fashion industry. In recent years, demands and competition in this industry has rapidly increased. Life cycle of shoes is short, leading to a higher level of waste in end-of-life. Despite this, very few studies have investigated the impact of waste on environment. Staikos and Rahimifard (2007) aimed to create an optimal method for waste management in footwear industry. They presented a decision-making model using analytic hierarchy process (AHP), which is a multi-criteria decision-making (MCDM) method. Normally, shoes waste management model consists of four options in end-of-life which are reuse, recycling, energy recovery and disposal. As a result, they develop a general model to an appropriate model. In addition, they try to use an associate software tool to support the decision-making model. Their research provided the optimal model for waste management process to represent responsibility for environmental and help the company to reduce cost in waste disposal process. However, this research focuses mainly on reuse, repair, recycle and refurbish of used shoes.

Research Methodology

This study starts from reviewing the used shoes supply chain by survey and review. Subsequently, interview of stakeholders in the chain will assist in obtaining more details. After that, value chain and value added are analyzed. Value Stream Mapping (VSM) is then employed to define and analyze the supply chain processes. Finally, suggestions are provided for improving the used shoes supply chain based on reverse logistics and lean concepts. The methodology of this study can be described as follows;

Preliminary Data Collection

This section is a review on the used shoes supply chain from secondary databases and documents for understanding this chain briefly. Survey of the chain and interview of stakeholders in the chain are then performed.

Value Chain and Value Added Analysis

Value chain analysis starts from analyzing activities which occur. Two categories are identified which are; primary activities and support activities. Finally, value added of the used shoes is focused by looking at value change in each step in the chain

Process Analysis

Value Stream Mapping (VSM) is used to define and analyze processes. Processes are identified into three categories; value added activities (VA), necessary but non-value added activities (NNVA) and non-value added activities (NVA). This step will enable the researcher to find the waste in these processes

.

Discussion and Report

This step will give some suggestion and concepts to help improving the process, after implementation and reporting.

Results

Overview of The Used Shoes Supply Chain

Rong Kluea market is located in Sakaeo, near Aranyaprathet border. There are 5 sub-markets including Old Rong Kluea market, Golden Gate market, Dech Thai market, Thesaban II (New- Rong Kluea market) and Benjawan market. Each market can be divided into specialty markets. For example, Golden gate market sells new and second hands items; Benjawan market sells second hands clothes and accessories, and Dech Thai market is specific to used shoes.

The used shoes supply chain start from middleman in Dech Thai market who import used shoes from other countries such as Korea, Hong Kong, China through Laemchabang port in approximately 45 containers per month. Middleman sells used shoes to 3 groups of merchants at Dech Thai market. After modifying processes used shoes are resold to tourists and merchants from province. Finally, used shoes are distributed to other second hand markets. The overviews of the used shoes supply chain in shown in Figure 1

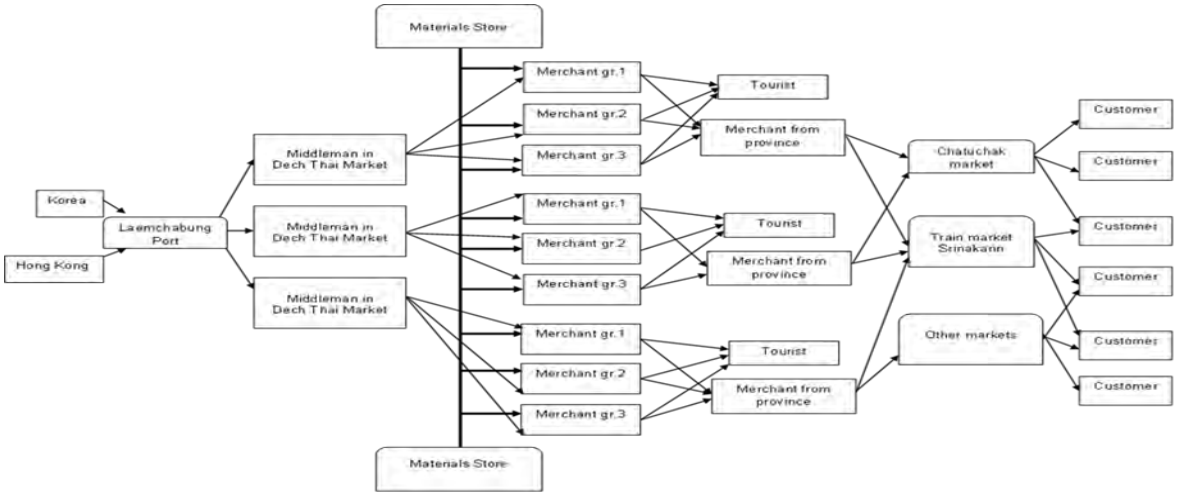

Figure 1: Used shoes supply chain

Value Chain Analysis

Value chain analysis aimed at finding value added activities in supply chain for understanding current concept. Nowadays, stakeholders try to create several activities for supporting their business. Table1 illustrate the used shoes value chain analysis. From this section, know what the activities stakeholders use to added value in the chain.

Primary Activity	Supply Chain's Activities	Advantages
1. Inbound Logistics	1.1 Import used shoes from aboard 1.2 Transportation Lamchabung > Dech Thai market Dech Thai market > Other markets 1.3 Dispense parts of shoes to labors	1.1 Get original brand name which have good quality 1.2 Transportation make the processes in supply chain drive and help to distribute goods to other provinces 1.3 Increase responsiveness of customers need
2. Operations	2.1 Separating 2.2 Selecting 2.3 Soles repairing 2.4 Washing 2.5 Repairing 2.6 Ornamenting heeled shoes & Painting	2.1 Easy to selecting 2.2 Can select used shoes in grade and price as they need 2.3 Repairing, washing, Ornamenting heeled shoes and painting are processes to added value for this products cause its make used shoes to durable and similar as new item
3. Outbound Logistics	3.1 Retail and wholesale sales	3.1 Retail is higher price but wholesale is lower price and specific to high quantity.
4. Marketing and Sales	4.1 Loyalty to customers for example;	4.1 Get customers reliability and

	Deliver goods to customers at right- time, right grade, right quantity and right place 4.2 Select used shoes in good quality for customers when they can't come to select by themself	keep business relationship 4.2 Get customers satisfaction
5. Service	5.1 Deliver for province customers 5.2 Compensate to customers in case deliver incomplete quantity	5.1 Increase number of customers 5.2 Get customers reliability and keep business relationship
Support Activity	Supply Chain's Activities	Advantages
1.Procurement	1.1Provide suppliers who have good quality of used shoes 1.2Provide suppliers who have good quality and inexpensive parts/implements	1.1 Reduce waste and cost 1.2 Get high benefit and good quality of materials
2.Technology Development	2.1 Contact with suppliers on aboard by email	2.1 Reduce cost and it is a rapid communication
3.Human Resource Management	3.1 Employ skilled labors	3.1 Get exquisite and high quantity products for response the customers need
4. Firm Infrastructure	-	-

Table 1: Value Chain Analysis by Activities

Value Change in Used Shoes Supply Chain

Used shoes are imported from other countries at low prices. Cost is about 13.75 Baht/pair. The middleman sells them to 3 groups of sellers in Dech Thai market at different prices. Subsequently, sellers push them into processes for added value. Trading of the used shoes are similar to retail prices and wholesale prices depending on quantity requested by customers. Each stakeholder benefits differently (Table2). Details of value change of the used shoes supply chain is shown in Figure 2

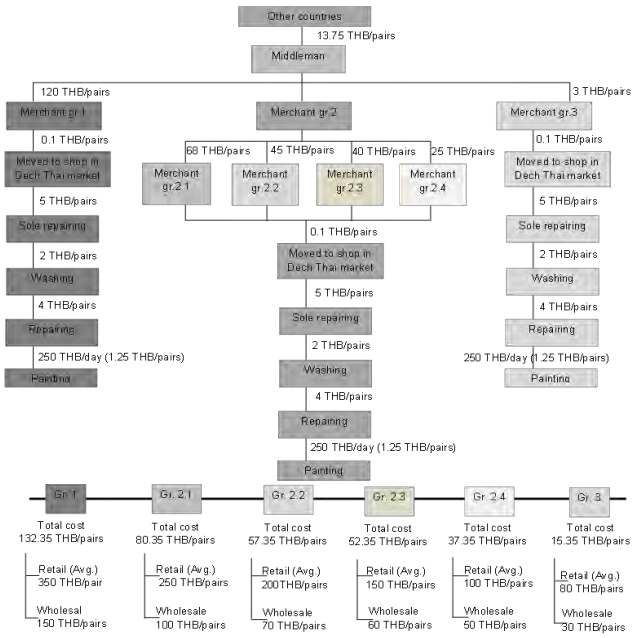

Figure 2: Cost-Benefit structure of each stakeholder

Stakeholders	Cost	Selling price (Avg.)	Margin
Middleman	13.75 THB/pairs	53.75 THB/pairs	290.09%
Merchants in group 1	132.35 THB/pairs	Retail (80%): 350 THB/pairs	131.56%
		Wholesale (20%): 150 THB/pairs	2.67%
Merchants in group 2.1	80.35 THB/pairs	Retail (80%): 250 THB/pairs	168.91%
		Wholesale (20%): 100 THB/pairs	4.89%
Merchants in group 2.2	57.35 THB/pairs	Retail (80%): 200 THB/pairs	198.98%
		Wholesale (20%): 70 THB/pairs	4.41%
Merchants in group 2.3	52.35 THB/pairs	Retail (80%): 150 THB/pairs	149.23%
		Wholesale (20%): 60 THB/pairs	2.92%
Merchants in group 2.4	37.35 THB/pairs	Retail (80%): 100 THB/pairs	134.19%
		Wholesale (20%): 50 THB/pairs	6.77%
Merchants in group 3	15.35 THB/pairs	Retail (80%): 80 THB/pairs	336.94%
		Wholesale (20%): 30 THB/pairs	19.09%

Table 2: Margin of Each Stakeholder

Value Stream Mapping

Value stream mapping is used to understand the current processes in the used shoes supply chain. The chain starts from a middleman in Dech Thai market who imports used shoes from other countries such as Korea, Hong Kong, China through Laemchabang port, approximately 45 containers per month. After paying the import duty, the used shoes are forward to warehouses in Dech Thai market. The middleman sells the used shoes to merchants in Dech Thai market who can freely select used shoes with grade and price as they need. These merchants are separated into 3 groups; Merchants in group 1 are the first selector. They can select whole goods in container; normally, they always select brand name grade as good quality. Group 2 selects goods which merchants group 1 did not select. Finally, group 3 buy used shoes in bulk. The used shoes are selected in order to be improved by washing, repairing and painting before reselling. The Value Stream Mapping of used shoes supply chain shown in Figure 3

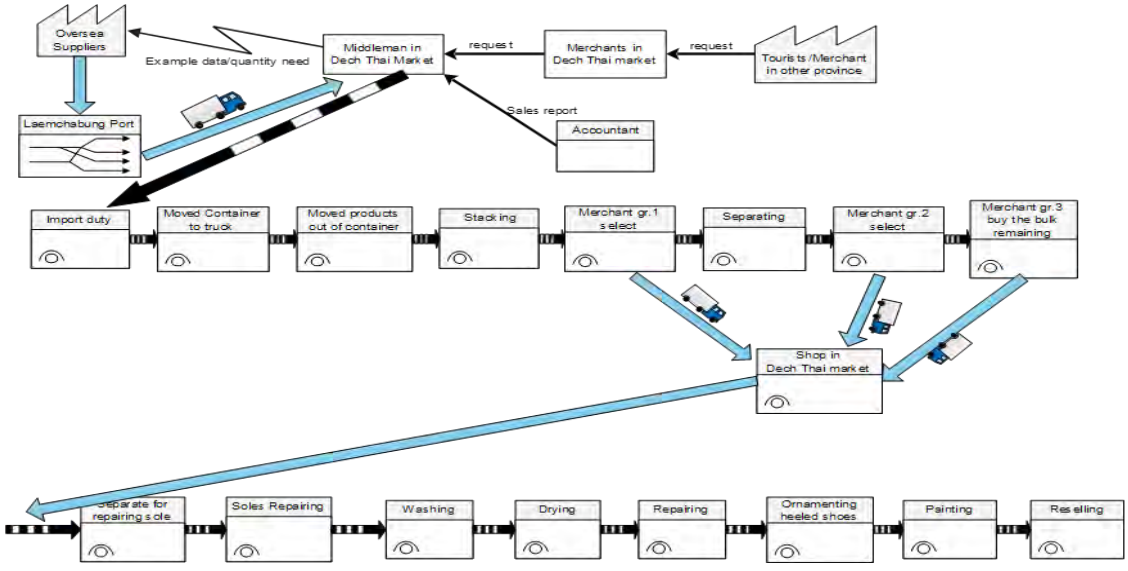

Figure 3: Current state of used shoes processes flow by using Value Stream Mapping (VSM)

Summary and Discussion

Used shoes are imported in approximately 45 containers /month (16 tons /container). Processes before reselling are sorting and repairing. Nowadays, there are no definite patterns within the supply chain. Some activities take long time to process. Moreover, there are many wastes from the imported

goods that could make a strong damage. For sellers, each pair of shoes has different prices which depending on merchantability and brands of products. Each stakeholder has similar processes but they do not get benefit equally. For further research, processes in the supply chain into 3 categories; non-value adding (NVA), necessary but non-value adding (NNVA) and value adding (VA) may be defined to eliminate non-value adding processes and to reduce processes time. So, stakeholders will get higher benefit.

Acknowledgements
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LOGISTICS COST ANALYSIS OF THAI HOTEL BUSINESS

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Abstract

Purpose: This study aims to identify components of logistics cost structure of Thai hotel business. Chiang Mai, one of the most popular tourism destination in Thailand, is chosen as a case study. The study is attempted to match activities between logistics and hotel business area and evaluate corresponding logistics cost of hotel business.

Design/methodology/approach: This study employs content analysis derived from logistics cost related to literature. Critical factors are identified and then validated through interviews with stakeholders of hotel business. It is subsequently formulated into a logistics cost structure which is later developed into a questionnaire. In order to validate and increase the robustness of the designed questionnaire, the pilot tests are undertaken. Afterwards, it is sent to stakeholders of the hotel business in Chiang Mai. Finally, component analysis of the logistics cost is carried out.

Findings: The logistics activities of hotel business are analyzed. Composition of logistics cost in hotel business is realized.

Research limitations: The data of this research is derived from hotel business stakeholders only in Chiang Mai. In order to generalize the proposed framework, a wider distribution of the questionnaire is recommended to increase the robustness of the framework.

Originality/value: A research framework is proposed in order to evaluate the logistics cost through identification of logistics activity.

Keywords: Logistics Cost, Supply Chain, Tourisms Industry, Hotel Business

Introduction

Tourism industry generates high income for many countries in the world. Thailand is one of the advanced countries of ASEAN that progress planning strategy of international tourism. Moreover, Thailand is listed as the third most popular tourist destination in Asia Pacific. (Song, et al. 2003)

Many people would like to travel in Chiang Mai, Thailand. Every year, there are a large number of tourists in Chiang Mai. Therefore, the local government tries to develop new tourist attractions because it can make good reputation and nice income to community and to the country as a whole. Regarding the rate of change in visitors between 2012 and 2013 in Chiang Mai, there was 9.88% growth for local Thai visitors and around 8.84% increase for foreign sector. Average length of stay of tourist in 2013 was longer than the previous year, leading to higher income for the province. The number of tourists, length of stay and revenue from tourism sector of Chiang Mai is outlined in Table 1. It was clear that there are big opportunities for hotel business in Chiang Mai. Several new hotels have been built continuously in recent years. Competition in this sector is getting fiercer. Individual hotel has their own tactics to attract customers including special offers, affordable packages, which could be major factors that tourists considered before making decision to book a room.

Hotel business has long time been recognized as a significant part of tourism industry since it could affect direction for traveling route. It is one of key factors for tourist selection and has an impact for tourists' decision. For example, if the tourists would like to travel to place A, but the price of hotels around the place A is very expensive. The tourists may go for lower priced hotels. This means that the tourists have to change route. Hotels were used to focus on facilities, and had fewer concerns on services. Nowadays, tourists can search and obtain detailed information from "Trip Advisor" by many websites, which provide a score of other tourist’s evaluation on many aspects. Thus, this tourist’s behaviour has been totally changed from the past and they are more interested in services. This

affects to the service industry positively. Logistics management for the hotel industry may help emphasis on quality of service for customer.

Literature Review

The literature review was divided into 3 parts including (1) framework of tourism supply chain, (2) logistics cost and (3) hotel businesses with logistics cost.

Framework of tourism supply chain

Tourism businesses involve with many related activities. They include hotel business, restaurants, travel agents, tour operators, etc., that can affect the whole chain, as shown in Figure 1

Type	January - December		
	2013	2012	Δ (%)
Visitor (Person)	**7,197,193**	**6,570,642**	**+ 9.54**
Thai	4,811,021	4,378,320	+ 9.88
Foreigner	2,386,172	2,192,322	+ 8.84
Average Length of Stay (Day)	**3.24**	**3.19**	**+ 0.05**
Thai	3.26	3.24	+ 0.02
Foreigner	3.22	3.13	+ 0.09
Average Expenditure (Baht/Person/Day)			
Visitor	**2,976.06**	**2,822.56**	**+ 5.44**
Thai	2,830.98	2,581.81	+ 9.65
Foreigner	3,228.35	3,196.79	+ 0.99
Revenue (Million Baht)			
Visitor	**58,368.42**	**53,863.72**	**+ 8.36**
Thai	33,980.88	32,530.56	+ 4.46
Foreigner	24,387.54	21,333.16	+ 14.32
Accommodation establishments			
Rooms	32,077	30,587	+ 4.87
Occupancy Rate (%)	44.91	40.07	+ 4.84
Number of Guest Arrivals	**5,310,230**	**4,565,728**	**+ 16.31**
Thai	3,113,909	2,630,043	+ 18.40
Foreigners	2,196,321	1,935,685	+ 13.46

Table 1**:** Internal Tourism in Chiang Mai **Source:** Department of Tourism (2013)

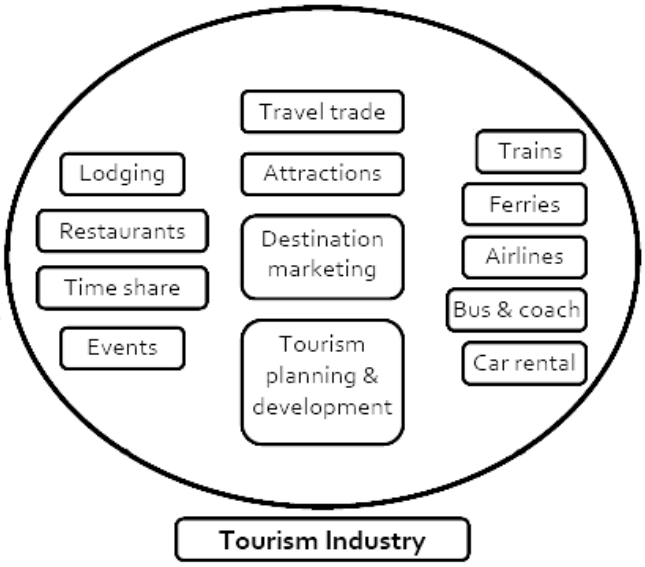

Figure 1: Major Stakeholders of tourism industry, adapted from Piboonrungroj and Disney (2009)

In term of tourism supply chain, quality and sustainable development are considered to be of great importance. They focus on product life cycle including raw material, data processing, productivity, distribution, client and final disposal. The sustainable development of tourism requires safety at work, safety of delivery product, disposal & recycle system and others. To support tourism supply chain and increase its efficiency, it should have infrastructure as shown in Figure 2

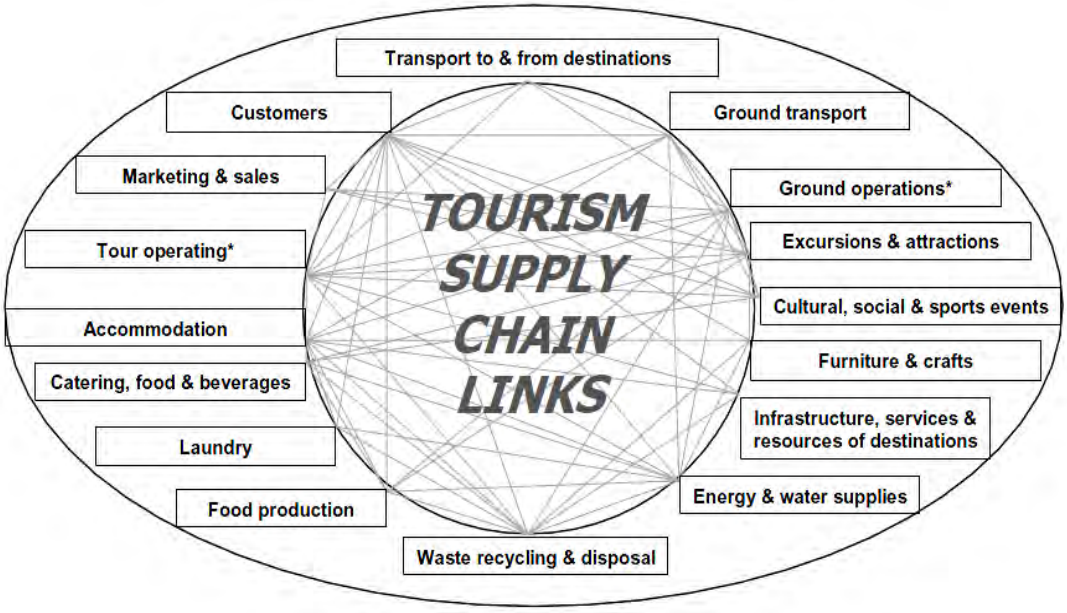

Figure 2: Tourism supply chain links, adapted from Tapper (2003)

Logistics cost

Logistics cost in an industry is applied for generating cost. Zeng (2003) divided the logistics activities with 6 issues for analyses of air shipment. Later, Kivinen and Lukka (2004) made the structure and performance in the new concept. Moreover, they grouped the logistics cost into 12 issues. The Department of Primary Industries and Mines in Thailand has defined the logistics cost with 2 groups which is the main logistics activities and the support activities. The logistics cost leads to planning cooperation, linkage of each activities and flow of information. This research will select the logistics activities for matching with hotel business activities for seeing the overview of logistics activities in hotel business.

Hotel business and logistics cost of hotel business

The concept of intellectual capital in the hotel business has emerged in the past (Engström, 2003). Kordel (2008) divided hotel logistics cost into 10 issues that include cost of supply activities, cost of information, cost of operation, cost of marketing, cost of distribution, cost of additional services, cost of insurance, cost of transport activities, cost of personnel and other financial costs. Regarding the logistics management of hotel business nowadays, they are not quite utilized as much. This is because the hotel professionals could not clearly understand and differentiate between logistics and supply chain function. They are simply treated as operations management instrument. Logistics and supply chain can improve their cost (Ante, 2007). Use of logistics and supply chain management is about consideration of technology, skill sets and capital investment in hotel business (Odoom, 2012). The research questions for this activity may be divided into seven groups, and should classify more activities that are proper with hotel business.

Research Methodology

The research methodology is as follows.

Previous researches on logistics activities, hotel business activities and supply chain of hotel business is intensively reviewed. Then, the content analysis is conducted to identify relationship between logistics activities and hotel business activities. The logistics cost of those matched activities are later surveyed in the group of hotel business stakeholders.

Questionnaire is designed to collect logistics cost that related to hotel business, then distribute to stakeholders of hotel business in Chiang Mai. In order to validate the questionnaire designed, the pilot test to selected respondents are undertaken to increase the robustness of the questionnaire.

Data from survey is evaluated and analyzed to attain logistics cost of hotel business. Analytical logistics cost is divided in different related activities.

Results

Data preparation and analysis

The study on logistics activities has been conducted together with hotel business activities. The content analysis is employed to obtain relationship between logistics activities and hotel business activities. Matching of those activities are presented in Table 2 The hotel business activities that related to logistics will then be included in questionnaire to conduct the survey on hotel businesses. Cost of hotel related to logistics perspective will then be disclosed after the survey.

Logistics activities	Hotel Business activities
1. Customer Service	**Pre-lodge** Pre-sales marketing activities Description of hotel and destination Picture-video of hotel and destination Reservations Traditional route Online intermediary route Direct online route Price list Opportunities and method of reservation Methods of payment Post-sales activities Visitor's book Frequently asked questions (FAQ) Complaints
	Intermediary-lodge Personnel Service Relaxation service Provide meditation environment Provide DVD music Social activities Provide recreation rooms for chatting and chess Provide family activities
2. Order Processing	Operational costs for room preparation Maintenance costs Technology costs Internet Program for business administration Staff Training cost
3. Demand Forecasting	Promotional campaigns Advertisements Customer relation management costs (CRM)
4. Transportation	Transportation costs Guest transportation shuttle system Limousine shuttle service Taxi shuttle service

Logistics activities	Hotel Business activities
5. Warehousing, Storage and Inventory Management	Storage costs of; Food & Beverage Amenity Spare parts for engineering Cleaning equipment for housekeeper Relocation Costs Storage space costs
6. Purchasing	Supplier contract costs Raw material costs Room division Amenity Food & beverage Spare parts for maintenance
	Outsource; Food & Beverage Amenity Spare parts for engineering Laundry & Dry cleaning Cleaner supplies Security guard
7. Logistics Communications	Communication with Clients costs Contact information Finding the hotel External links

Table 2: The concept matching

Data collection

The survey was conducted among the hoteliers in Chiang Mai. Total numbers of registered hotels are 699 units with 7 classifications. The number and classification of hotels in Chiang Mai is exhibited in Table 3.

Detail		Number of hotel	%
Hotel List In Chiang Mai (Muang District)			
	Hotel Group 1 (>, more USD 100)	46	6.58
	Hotel Group 2 (USD 50-99)	49	7.01
	Hotel Group 3 (USD 30-49)	35	5.01
	Hotel Group 4 (USD 15-29)	90	12.88
	Hotel Group 5 (<, lower USD 15)	80	11.44
	Guesthouse (USD 12-80)	179	25.61
	Resort (USD 30-250)	143	20.46
	Other	77	11.02
	Total	699	100.00

Table 3: Hotel list in Chiang Mai in 2013 Source: Department of Tourism (2013)

Almost 50 data was primarily collected from samples to realize overall hotel cost structure and related logistics cost in the Hotel business. Initially, the major hotel cost was associated with food and beverage, salaries and wage, room division and utility cost, respectively. Logistics cost represented only a minor portion in this business since the accumulative of those logistics cost is only 10% of overall cost. The category of hotel business cost is exhibited in Figure 3

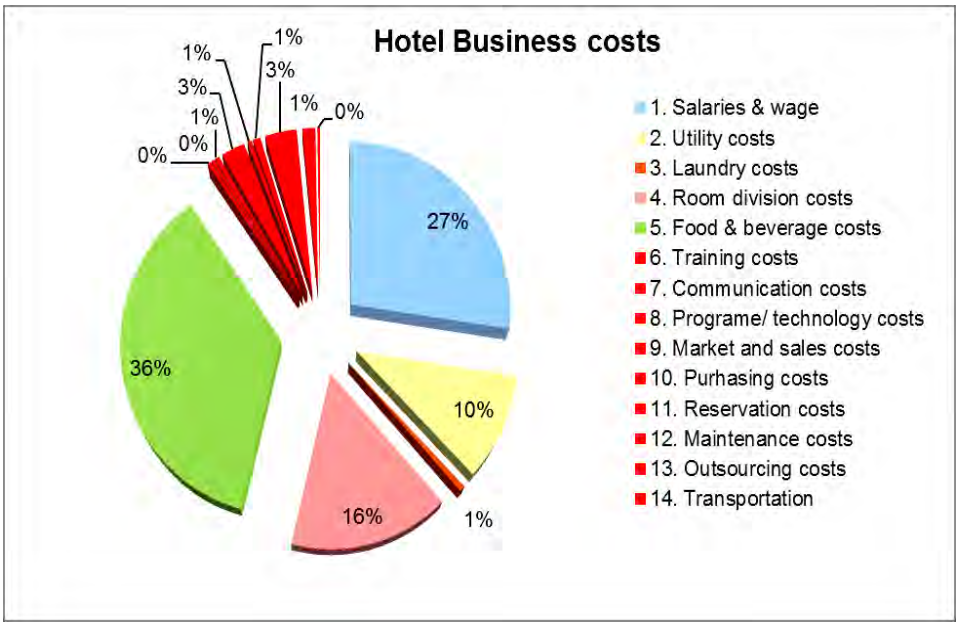

Figure **3:** Cost of Hotel Business

The logistics cost of the hotel is later categorized into 7 activities, consisting of (1) customer service, (2) order processing, (3) demand forecasting, (4) transportation, (5) warehousing, storage and inventory management, (6) Purchasing and (7) logistics communications. The 1st major logistics cost in Hotel business is the warehouse and inventory cost, including hotel storage cost for food and beverage, amenities, engineering spare part etc. The 2nd major logistics cost is demand forecasting that contains key marketing activities of the hotel such as hotel promotion, special deal, CRM activities etc. For the 3rd major logistics cost, it is purchasing activity which consists of operational costs for room preparation, maintenance costs, staff training cost. Following by order processing, it involves with raw materials costs of room division, amenity, foods beverage and spare parts for maintenance, and include outsourcing activities cost etc. The 5th major logistics cost goes to customer service including reservation, service cost etc. For transportation and logistics communication cost, they are similar to transportation such as limousine and taxi shuttle service, logistics communication managed communication with clients costs which included contract information, finding the hotel, etc. as shown in Figure 4.

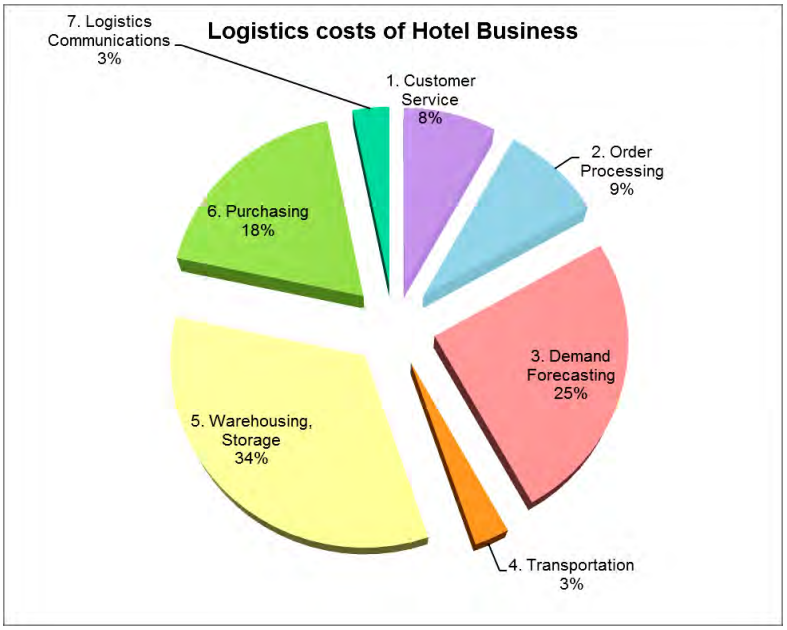

Figure 4: Logistics cost of Hotel Business

Figure 5 introduces the logistics costs per sales ratio for each industry including food, textile, electric and electronics, automotive and plastic industry compared with hotel industry. It shows that hotel industry has the highest logistics cost (about 10% of total logistics cost per sales ratio). Plastic industry is second, followed by automotive industry, electric and electronics industry, respectively. Food and textile industries have lowest logistics cost and they are equal at 6.6%.

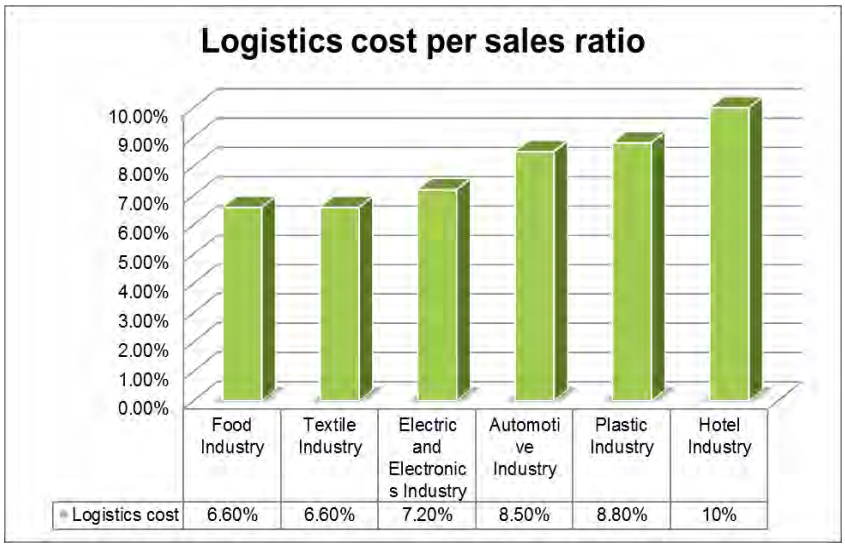

Figure 5: Logistics cost per sales ratio, adapted from Logistics Service Information Center: LSIC

Conclusion

This paper examines the logistics cost from logistics activities with information by Department of Primary Industries and Mines (DPIM). The logistics cost of each activity was then matched with activity of hotel business. In addition, our research validates the logistics cost through interview with stakeholders of hotel business. From the findings, it was shown that the logistics cost is accounted for about 10% of the hotel business. An analysis of comparative logistics cost per sales ratio with other industries is evaluated. It was found that the logistic cost of hotel sector is the highest sales ratio, hence, the highest logistics cost among major industries. Due to the logistics costs of hotel activities have a few portions in total cost of hotel business but it is latent costs which dispel every activities. However, if business owner can control the logistics cost of their business well, the business will be able to reduce the operating cost of running a hotel enormously.

Future work

This study of logistics cost can be adapted to incorporate the additional information applied to the model of logistics cost for further improvement. Moreover, value stream mapping may be used to measure the performances of each identified logistics activity. It will lead to improve the logistics cost of hotel business.

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AWARENESS AND ATTITUDES FACTORS INFLUENCING THE ADOPTION OF ENVIRONMENTAL MANAGEMENT PRACTICES FOR LOGISTICS COMPANIES.

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Introduction

This research focusing on determining the factors influencing the environment management practices adoption in Malaysia logistics industry. Several researchers have suggest various explanations on the factors influencing the implementation of environment management practices (e.g., Alvarez-Gil et al., 2007; Aragon-Correa et al., 2004; Gadenne et al., 2009; Henriques and Sadorsky, 1999; Lopez-Gamero et al., 2008, Williamson et al., 2006). Variables including technological factors, organizational factors, and environmental factors are frequently appeared in the environment management practices study (Gonzalez-Benito and Gonzalez-Benito, 2006a). Although these three factors have been taken into account in several studies on environment management practices issues, the factor of environment awareness and attitudes have not yet been considered in the studies of environmental management in the logistics industry (Lin, 2011).

Technological factors

Technological factors are the factors that commonly found in the literature of technology innovation. Environment management practices are one of the practices that considered as a technology innovation (Lin, 2011). However, the influences of technological factors towards environment management practices adoption are hardly analyzed (Lin, 2011). Three variables of technological factors are consistently been found to be influencing on technology innovation (Frambach and Schillewaert, 2002; Jeyaraj et al., 2006; Rogers, 2003). The three variables are: relative advantage, compatibility, and complexity (Rogers,2003; Sia et al., 2004).

Organizational factors

Organizational factors are commonly analyzed in research on technology innovation and environmental management. Variables such as quality of human resources, top management's leadership skills, organizational support, organizational culture, and organizational size have been discussed on their influences on technology innovation (Kimberly and Evanisko, 1981; Tornatzky and Fleischer, 1990) and environmental strategy (Gonzalez-Benito and Gonzalez-Benito, 2006a). This research focuses mainly on the organizational support, quality of human resources, and company size because they are organizational resource-related variables widely analyzed in research on technology innovation and environmental management.

Environmental factors

The environmental factors in this study refer to the external environment in which a company conducts its business. Several environmental variables such as stakeholder pressure, environmental uncertainty, environmental munificence, governmental support, competition, and network relations have been discussed in the literature of technical innovation (Frambach and Schillewaert, 2002; Jeyaraj et al., 2006) and environmental management (Etzion, 2007; Gonzalez-Benito and Gonzalez Benito, 2006a). Stakeholder pressure, external resource availability, and environmental uncertainty are consistently regarded as primary environmental factors influencing technical innovation (Jeyaraj et al., 2006; Tornatzky and Fleischer, 1990) and environmental strategy (Aragon-Correa and Sharma, 2003; Etzion, 2007; Rothenberg and Zyglidopoulos, 2007). The government plays an important role in supporting resources for innovation adoption (Lee, 2008; Scupola, 2003). Therefore, this study focuses mainly on the influences of stakeholder pressure, governmental support, and environmental uncertainty.

Environmental awareness and attitudes

A company may choose to adopt environmental-friendly processes and procedures regardless of whether they are required to do so by law, or whether they believe that profits will increase (Gadenne, Kennedy & McKeiver 2009). Individual behavior is believed to be affected by the beliefs and attitudes of the individual (Ajzen and Fishbein, 1980), and for some, treatment of the environment is an ethical issue. It is expected that those who are aware of environment issues and are concerned about the impact of their business on the environment will be more likely to act to reduce the impact of their business activities. Those who regard environmental management as an ethical issue (or want to be perceived as such) might also support environmental activist groups (Gadenne, Kennedy & McKeiver 2009). A potential and large number of businesses could be engaging in a combination of environmental activities, such as recycling, waste management or energy conservation without engaging in formal certification processes (Hillary, 1999) either because of moral concerns or because they see the economic benefits of such actions.

Numerous studies have reported that company's owner is concerned about their environmental impact (e.g. Groundwork, 1995; Roberts et al., 2006; Tilley, 1999). However, empirical studies which relate attitudes to environmental performance have produced mixed findings. Schaper (2002) found no relationship between positive personal environmental attitudes and positive environmental performance. Tilley (1999) also reported a gap between the attitudes of small business owners and their environmental behavior. In contrast, Naffziger et al. (2003) reported that managers with a high level of concern for the environment expend more time and resources on environmental initiatives than those with a low level of concern.

Environmental awareness was divided into two categories – general environmental awareness and cost-benefit environmental awareness. The former was measured relating to their firm's environmental impact, environmental initiatives, environmental policy, ''best practice'' in environmental performance, and how legislation affects the business (Gadenne, Kennedy & McKeiver 2009). The latter was measured relating to the effect of improved environmental performance on significant cost benefits and improved production efficiency (Gadenne, Kennedy & McKeiver 2009). Environmental attitudes were determined through responses that relate to personal environmental attitudes adapted from Schaper (2002). Therefore, we expect that environmental awareness and attitudes will positively affect the adoption of environment management practices for Malaysia logistics companies.

Environmental awareness and attitudes factors as a moderating variable

Researchers have identified several factors that may limit the environmental behaviors of logistic companies owners. The level of environmental-friendly practices may be affected by a number of factors that could be classified as 'moderating variables'. The literature shows that other factors in determining the extent of environmental awareness include access to information (Lepoutre and Heene, 2006; Roberts et al., 2006; Zutshi and Sohal, 2002), time and cost factors (Biondi et al., 2000; Hillary, 1999; Lepoutre and Heene, 2006; Roberts et al., 2006; Tilley, 1999), and owner/manager personal characteristics such as age and education (e.g. Petts et al., 1998; Schaper, 2002). It appears that logistics companies owners do not have good information on environmental issues (Tilley, 1999; Williamson and Lynch-Wood, 2001), are not even sure if they understand the relevant legislation (Williamson and Lynch-Wood, 2001), and are unaware of many of the initiatives providing support and information for small businesses (Tilley, 1999). Moreover, business owners work long hours and have little time to learn about environmental issues (Dilts and Prough, 1989; Friedman et al., 2000; Hillary, 1999; Rutherfoord et al., 2000; Schaper, 2002). Lack of adequate financial resources is also a deterrent to managers (Biondi et al., 2000; Gerrans and Hutchinson, 2000; Hillary, 1999; Netherwood, 1998; Tilley, 1999). Higher education has been shown to be associated with higher level of environmental concern, but not necessarily with environmental behaviour (Olli et al., 2001). The effect of age appears to be more difficult to discern. Petts et al. (1998) note that although national surveys indicate that younger people

appear to be less concerned about the environment than older people; in focus groups, younger managers seemed more interested in the environment. Schaper (2001) found that newer owner/managers were more likely to display a positive environmental attitude. Olli et al. (2001) suggest that although newer companies are more interested in the environment, there is an older cohort who had experienced more difficult economic conditions and now act in a less wasteful manner.

Conceptual Framework

As adopting environment practices involves implementing new technology innovation, techniques, and systems to reduce pollution emissions and energy consumptions, the adoption behavior can be regarded as a technological process. In this research, the environment management practices will be analyzed in the dimension of technological factors, organizational factors, environmental factors and environmental awareness and attitudes factors simultaneously.

Figure 1 illustrates the research framework of the research. The technological factors include the relative advantage, compatibility, and complexity of environment management practices; the organizational factors include organizational support, quality of human resources, and company size; environmental factors include customer pressure, regulatory pressure, governmental support, and environmental support and lastly the environmental awareness and attitudes includes general awareness, cost benefit awareness and environmental attitudes.

Target Group

Sample randomly drawn from the list of Federation of Malaysian Freight Forwarders consists of 1,135 members.

Filling the Gap

In order to fill the research gap, this research aims to study the influences of technological, organizational, environmental and environmental awareness and attitudes factors on the adoption of environment management practices for the logistics companies in Malaysia.

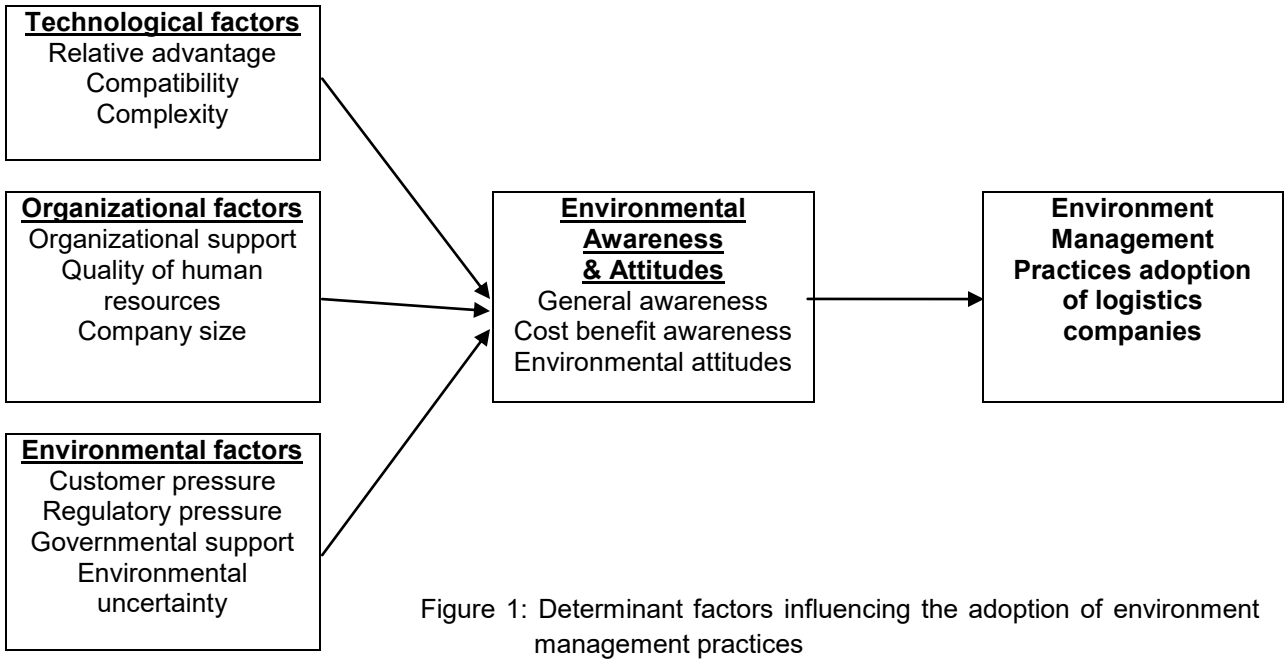

Figure 1: Determinant factors influencing the adoption of environment management practices

Discussion and conclusion

This research focuses on issues related to environmental issues in the logistics industry. Environment management practices are the important issues that have been highlighted. The research reported above includes a variety of several important findings. Some of these findings merely argued the importance of environmental issues for the logistics industry (Rodrigue et al., 2001; Rondinelli & Berry, 2000); some explored the environmental practices adopted by the logistics industry (Murphy & Poist, 2000, 2003; Wu & Dunn, 1995); and some introduced some possible factors that may influence the adoption of environmental practices for the logistics companies (Lin & Ho, 2011; Murphy et al., 1994; 1995; 1996; Szymankiewicz, 1993; Wong & Fryxell, 2004).

This research highlights the need for future researchers to endeavor to raise the quality of research in environmental issues in the logistics industry. Future logistics research would benefit from other methodologies such as field experiments to show causality, and relying on actual behavior rather than intended behavior.

Environmental management provides an important framework for a researcher to understand environmental change and is an important means of solving a country's ecological problems. Environmental management is a complex, dynamic and interactive process with many paradoxes, and is a multidisciplinary phenomenon and should be viewed from a technical, managerial and social perspective. Lin & Ho (2011) analyzed the influences of technological, organizational and environmental factors on the adoption of environmental practices in Chinese logistics industry. However, there is an amount of explanations as to why manufacturing firms should engage in environmental activities, including stakeholder pressure, environmental regulation, industrial sector, company size, mangers' characteristics, human resources, internationalization, organizational structure, corporate operation activity, environmental technology characteristics, position in the value chain, strategic attitude, and geographical location (Etzion, 2005; Gonzalez-Benito & Gonzalez-Benito, 2006; Pun, 2006). As all industrial sectors are not exposed to the same types of pressure or to the same extent, there is a clear research need to explore more potential factors that will influence the adoption of environmental management practices for the logistics industry.

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An Issues and Challenges of Supply Chain Efficiency Performance towards Trade Liberalization: A Conceptual Model

Article Classification: Literature Review
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Abstract
This paper discussed the review on issues and challenges on the supply chain efficiency towards trade liberalization. Nowadays trade is being fiercely competitive and came in a very complex flow of supply chain throughout globalization. Better supply chain can reflect better opportunities and development with higher foreign investment coming in. This has giving lot of pressure for developing countries to reach an excellent services in order to provide an efficient supply chain flow with a lower cost and at the same time increasing profitability. Supply chain efficiency is the important key value driver it differentiate reliability of the country's trade in today's competitive market. The intensive growth on productivity when adapting the trade liberalization has given a numerous impact to many countries. The evolution of technological and the effect of globalization have extensively enhanced the potential of free trade around the world. Therefore, global competition has become more and more intense. Survival in the age of free trade will certainly depend of building sustainable competitive capabilities, which may include a variety of key competencies, such as speed, reliability, responsiveness, product quality, and appropriateness of marketing and management strategies. However, in order to have an optimized benefit of trade growth the player in the industries need to use the right approach such as identifying the issues that affect the supply chain efficiency reliability and performance in trade liberalization. The issues and challenges to determine successful trade liberalization will be the main focus of this paper. This study will also highlight the weaknesses and deficiencies in trade industry towards supply chain efficiency. As a developing country, Malaysia can take an early prevention to eliminate such issues and by referring on challenges that took place in other countries, we can improve the efficiency of the supply chain and develop the most efficient productivity in chain network.

Keywords: Supply chain efficiency, trade liberalization, issues in supply chain towards trade liberalization, challenges in trade liberalization, factors, industry performance

Introduction

Since 1950s, the multilateral and bilateral liberalization have shown that an extensively lower the trade barriers in highly developed economies followed more recently by developing countries. According to Henry et al (2009), the average contribution of trade to efficiency was 11 per cent in 1970, rising to 11.6, 11.8 and 12.1 per cent in 1980, 1990 and 1997 respectively and had been observed to have a positive effect towards trade on efficiency. The effect of trade on efficiency has therefore been increased when countries have become more open to international trade over time. Since trade liberalization has been introduced there was a mixed perception on the benefit gained from the growing productivity. Although trade liberalization will increase the economic growth in regards of competitiveness, details on various factors need to be considered. For developing countries, the factors might not be overwhelmed by the presence of liberalization due to difficulties to increase the growth activities in the fiercely competitive market.

One of the important factors is to identify the problem which can encounter the ability of a country to perform in an optimum level and regain economic advantages. A great coordination of supply chain efficiency is one of the improvements that need to be considered. Supply chain efficiency has become

one of the triggers as a key value driver for trade development. It is because in today globalization trade, it is a major concern to battle among them for businesses and appears as a critical tool in gaining the business competitiveness. This has been supported by previous studies (Christopher, 1998, Hult *et al*, 2007; Khalid, 2009; Tukamuhabwa, et al, 2011). According to Ali and Guo (2005), the efficiency of supply chain has arisen as a key factor in determining the ability of developing nations to attract foreign direct investments (FDI) and trade, thus is a key to their economic growth. For trade-dependent economies, the need to enhance their trade competitiveness is an importance nowadays. Indeed, the absence of a competence transportation system can be a hindrance to efficient production which in turn can blunt their trade and national competitiveness. Furthermore, to enhance international trade, investments and economic activities must continuously improve the links between its trade gateways such as ports and its economic hinterlands, and also extend their connection to the global supply chain (Khalid, 2009).

An efficient supply chains are critical (Brooks, 2012), for APEC countries. In order to sustain or even expand the economic benefits from trade, an important focus of the global parts and components trade where aspects of supply chains such as costs, reliability, flexibility, and resilience are crucial. An examination of the state of supply chains in APEC economies through the Logistics Performance Index reveals that a number of APEC economies can further expand trade by improving their supply chains through broad reforms involving both hard and soft infrastructure. Therefore, it is important to identify the critical factor that related to supply chain efficiency issues so as to face trade liberalization in near future to achieve advantages. Thus very limited dissemination of information for the purpose of challenges faced by the practitioner towards this topic has been discussed. Hence, base on the study that is still ongoing, this paper will examine and reviews problem that encounter by the practitioners involved in the industry and produce a conceptual model based on the literature review.

Background of the study

To support the supply chain activity there is a crucial need to have an efficient base line in SCM. Based on Khalid (2009), the importance of supply chain management in facilitating business and trade should become very clear. Without efficient supply chain management, goods cannot flow smoothly from manufacturers to markets. When this happens, a series of negative chain effects will be triggered. To shippers, the cost of holding inventory will rise. Critical goods will not reach consumers. Raw materials will not arrive at factories. Bottlenecks will be formed along the supply chain, and the cost of transporting goods will increase due to the delays and interruptions. With this kind of slack that happen during the trade liberalization implementation it can cause a major disruption along the process to become the world greatest trade productivity achiever and thus a world class supply chain industry. More expenditure has been spent into the supply chain activities by bigger company in order to have optimum profit. This is to strategies their supply chain activities into competitive advantage and eliminates the barriers and wastage of resources that obstruct the efficiency of trade activities. As a result, firms have to recognize the significance of enhancing their supply chain performance (Knowle et. al, 2005).

The World Economic Forum's report in (2013), found that by reducing even a restricted set of supply chain barriers halfway to global best practice would yield a nearly 5% increase in GDP, or six times the benefit of removing all remaining tariffs. They have highlighted; that best practical way to increase the productivity trade is by reducing the bottleneck which affects the trade activities. The initiative's 2013 report also indicated that reducing supply chain barriers could increase the world's gross domestic product (GDP) by over US$ 2.5 trillion (RM8.5 trillion).

Supply Chain Efficiency

Supply chain has involved many prominent activities which can lead us to an extraordinary results for company who can provide an efficient services such as on time delivery, providing lower cost, giving quality services and able to satisfied the customer will earn the most profitability for a long run (Chibba 2007, Borgstrom, 2008, Khalid 2009, Boonpattarakan 2012). In today's competitive trade and business arena, companies which fail to manage their supply chains well, will risk losing customers and incurring high costs. As companies expand to reach their markets, the costs of production and transportation increase and competition heats up. Companies need to free up resources to focus on coming up with better products and services. The approach of managing supply chains in a detailed and all-

encompassing manner from the production end to the consumption end can promotes cost effectiveness, efficiency, reliability, productivity, safety, security and ultimately customer satisfaction (Khalid, 2009).

According to Borgstrom (2008), supply chain efficiency defined as “supply chain is a specific activity system, where the efficiency is compound and negotiated along the chain. The efficiency is therein described as a compound evaluation of quality, delivery, cost, and overall capability that is not only planned and reviewed in the relationship but also a measure of the relationship. The efficiency of the producing/using system is influenced by serial interdependencies through relationships and thus evaluated of several parties within the exchange system and negotiated interdependencies determine on efficiency goals”.

Based on a study by James (2012), there is a direct connection between cost and speed; and cost and reliability. Accordingly, as reliability and speed increase, costs will generally expand and with a decrease in costs, reliability and speed will generally reduce. For instance, if the reliability, speed, and other features of a connection in a supply chain satisfy the needs of its consumers at the lowest cost, that connection can be considered as efficient. The lowest cost would render the connection efficient for society. Only if the lowest budgeting cost to the entire service provider is included, the connection would be efficient. The efficiency of supply chain has emerged as a main factor in determining the ability of developing nations to attract foreign direct investments and trade, and also key to their economic growth (Lu and Yang, 2007).

Issues in Supply Chain Efficiency towards Trade Liberalization

The innovation landscape and direction of industry’s supply chain has taken into different point of view throughout the world because of affection to regain competence and efficient chain connectivity has been major success to provide customer satisfaction. This has been mentioned by a literature that a variety of benefits have been achieved through efficient supply chain management, including reduced costs, improved market share and sales and solid customer associations (Ferguson, 2000). Performance of the supply chain efficiencies has been addressed to weaknesses and deficiencies as a major impediment for a company to uncover the overwhelmed effect which can produce a significant quality of supply chain environment and attain competitiveness beneficial. Arvis in his study with World Bank (2014), stresses that a country cannot improve through developing infrastructure, while failing to address border management and other supply-chain issues.

Therefore, according to Khalid (2009), companies nowadays constantly seek to eliminate bottlenecks to ensure their products reach their customers fast and in a cost efficient manner. In doing so, they are reducing the inventories, keeping a close network of vendors and suppliers, outsourcing logistics services, and enhancing distribution capacity. These issues and challenges that encounter along the liberalization formation can paralyzed the successfulness of trade growth and reliability of supply chain activities. As a result, in this paper five major constraints that affect the efficiency of chain connectivity in trade liberalization have been identified. These five factors are extremely important towards a successful efficient liberal economic growth.

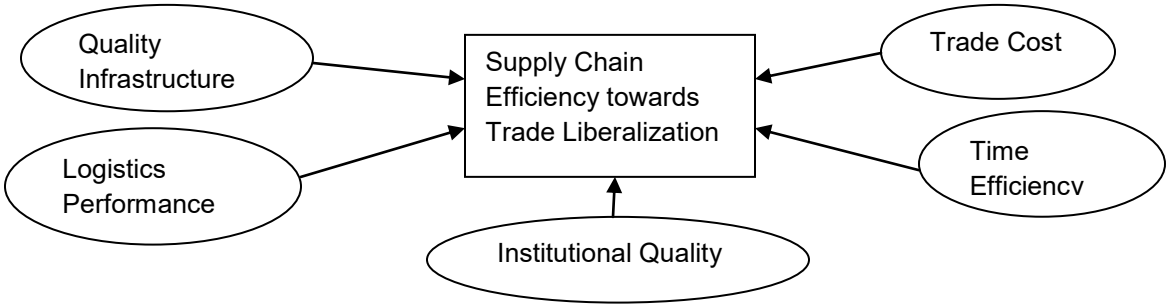

Figure 1: Framework of supply chain efficiency towards trade liberalization

Quality Infrastructure

Trade facilitation was introduced during the negotiation on trade liberalization which has now become a substantial feature in gaining a competitive market. In order to have successful trade liberalization is the quality of infrastructure play a role in the overall successful of trade growth. Burn et al. (2005), also highlighted the importance of the quality of physical infrastructure for trade. Wilson et al. (2004) have quantified the effects of trade facilitation by considering four aspects of trade facilitation effort: ports, customs, regulations, and e-business which are the key for all types of trade to achieve the chain capacity. There are numerous situations that can cause disruptions to supply chains. One of the causes is lack of sufficient infrastructure to handle the demand of the supply chain and provide efficient. If the demand for a commodity grows rapidly, the available capacity may unable to handle the increase in demand and consequently cause delays to the delivery (Gerber, 2010).

According to WEF (2013), insufficient overall infrastructure and poor connectivity are major obstacles for the development of many countries towards achieving efficient competitiveness and this will weaken the reliability of supply chain activities. A practically well-established body of literature has found an understandable link between the quality of infrastructure and transport costs in international trade such as (Limão and Venables 2001; Clark et al. 2004). Lima˜o and Venables (2001) have showed that infrastructure is quantitatively important in determining total transport costs. They estimate that poor infrastructure accounts for 40% of predicted transport costs for coastal countries and up to 60% for landlocked countries. Bougheas *et al*.(1999) also provide an evidence by using the gravity model to proven the European countries with connecting infrastructure to transport costs and hence trade which encounter a significant relationship that reflect the deficiencies and also the ability of a supply chain to be efficient. All of this has given an indirect impact to the establishment of supply chain efficiency. Poor infrastructure can cause a rising cost in transportation and delay as well. For supply chain efficiency it aims to achieve on time delivery, minimizations of cost with maximize utilization of resources.

Transportation system

Good supply chain connectivity need to be categorized by how well the infrastructure is being served in the country. A weak infrastructure can lead to severe damage of the performance and effectiveness of a transportation system and thus the ability to attract FDI interest. Therefore, a competent transportation system connecting various transport modes, links and channel is critical to facilitate the higher demand and flow of a nation's production system and also to enhancing its trade competitiveness. Without such transportation system, insufficient distribution channel and infrastructure bottleneck will destroy the chances to become competent with a better supply chain services. Therefore, nations that are unable to hold trade efficiently and with cost effective approach will not be able to survive with the increasing of trade volume. As a result, they could be portrayed as not competitive and might hindered by businesses and investors who increasingly are putting an excellent good transport system and services in their decision to set up foundation hence to invest in a particular country and region. An efficient trade transport network is crucial for developing countries to channel aid in efficient supply chain activities whose economic growth is trade-dependent and export-oriented and also to penetrate the bigger market (Khalid, 2009).

Logistics Performance

According to (World Bank, 2014), the Logistics Performance Index measurement is based on efficiency of trade supply chains. Supply chains are the backbone of international trade and commerce especially in trade liberalization. Supply chains are a complex sequence of coordinated activities. The whole performance depends on government interventions such as infrastructures, logistics services provision, and cross-border trade facilitation. The gap between the countries that perform best and worst in trade logistics is still quite large, despite a slow concentration since 2007. This gap continues due to the complication of logistics-related reforms and investment in developing countries, despite the universal strong recognition that poor supply-chain efficiency is the main barrier to trade integration in the modern world. Logistics performance is strongly associated with the reliability of supply chains and the predictability of service delivery for producers and exporters, and it is also shown that supply chains are only as strong as their weakest links. They are also becoming more and more complex, often across many countries while remaining critical to national competitiveness.

Trade Cost

The excellence of supply chain efficiency is based on cost minimization. Nowadays cost plays a crucial factor to determine the higher impact on trade competitiveness. According to (World Bank, 2011), high transactions costs related to trade are driven by how public policies, regulations, and procedures interact with import and export of supply chains industry. When indirect costs occurred during the supply chain process, delivery times and reliability are being very uncompetitive and this has severely affecting a country's position in highly competitive international markets that demand has to be just-in-time for any delivery. Moreover, the value of products often declines with time while in transit, usually for perishable products, spoilage and waste can increase perpendicular with transit time. These costs can also reflect lost opportunities to party that involves in the chain connectivity, as when critical inputs cannot reach manufacturing plants in time or perishable commodities cannot reach markets in time or when production plants must hold higher-than-optimal levels of raw material inventories to cover for logistics delays (Subramanian, 2012). All this critical issues need to be addressed correctly in order to establish a better supply chain activity and also to gain customers trust.

Logistics Cost

The importance of the logistics industry to different players in the supply chain consists of efficient and timely movement of goods and the provision of competitive services among players. Production, distribution and marketing costs will be high or low depending on how logistics firms are able to efficiently do their part in the supply chain. Inefficiencies in the transport and logistics service industry contribute to the high cost of doing business. Higher logistic costs are mainly due to poor infrastructure facilities in the country. Logistics costs include transport, packaging, storage, inventories, administration and management, are the key consideration for all players in the international logistics chain. Uncontrolled logistics costs prevent companies to sustain in a competitive edge and they will experience trade reduction since higher logistics cost translate the competitive import and export prices. Logistics costs are more important for developing countries, where they have been estimated to be the highest in the world (UNCTAD, 2005). Several factors contributed to differences in cost levels and structure, including the efficiency of distribution systems, the quality of transportation infrastructure, and the regulatory and institutional frameworks. Without these important criteria's a country cannot cope with tremendous trade activities growth.

Time Efficiency

Part of supply chain efficiency factors that can be related to trade liberalization is delivery and delivery has been defined as the time to deliver the goods on time. The precise time goods arrive at the final destination give a great achievement for the supplier and manufacturer and support the growth in trade. When issues like delays arise it will effect overall supply chain of an industry. The time delays caused by the lack of trade facilitation also obstruct the benchmarking on competitiveness. Bin (2009) has identified delays in customs increase warehouse and storage costs as being among others factors that influence barriers. Such delays have an effect on the quality of goods thus lead to the cancellation of orders and claims of damage compensation. According to Djankov et al. (2006), one additional day in export time is equivalent to 1 per cent increase in distance, and a 10 per cent increase in the time it takes to move goods from factory to ship would reduce the exports of time-sensitive goods by 6 per cent. Most of the delays are due to administrative hurdles, such as numerous customs procedures, tax procedures, clearances and cargo inspections.

These issues have been identified by other researcher like Alburo (2009), according to him, on the Petrapole-Benapole border activities, close to 80 per cent of the loss of time is related to parking, customs clearance and crossing the border. Those issues must be addressed by trade facilitation rather than transport-related measures. For example, delays related to the actual border crossing reflect inadequate warehouses, a lack of safety measures at the border, congestion, poor entry formalities, and other factors. The amount of time spent loading and unloading is also related to trade facilitation measures, specifically: (a) loading cargo at the point of departure or exit; (b) unloading cargo carriers from the exiting country at the border; and (c) reloading cargo into carriers of the arrival country. To the extent that there are restrictions on cross-border movement of cargo vehicles, these border activities lead

to time losses on the part of the exporting country (up to the border) and on the part of the importing country (from the border).

Custom Efficiency

The efficient movement of goods to and from manufacturing facility until they reached the customer is crucially essential in which to any world class manufacturing facility must have an access to an outstanding source of material and component. Efficient movement is also important component in supply chain efficiency to achieve a significant benefit. For modest improvement in trade facilitation such as custom administration would lead to increases of US$ 1.5 trillion (RM 5.1 trillion) equal to 2.6% in global GDP and US$ 1.0 trillion (RM 3.4 trillion) corresponding to 9.4% in global exports by World Economic Forum (2013). Efficiency of customs administration refers to the speed and ease which imports and exports can clear customs with minimum time along with the quality and range of services provided by the national customs authorities. Inefficiency usually reflects an insufficient distribution of resources to customs agencies or a malfunction to adopt best practices in customs procedures. These issues can include frequent inspections and long wait times. Border delays and burdensome requirements can extend beyond a customs administration to include a lack of coordination between border agencies and compliance with import-export standards. Thus far, nowadays companies spend significant amount of money, time and effort to re-engineer their supply chains through business practice changes and technology. Cost deduction and increasing speed of delivery are the key value to drive in any business these days. A delay and problems arise in standards inspection showing as poor customs procedures can actually create a severe supply chain connectivity problem and thus fail to gain overall of supply chain efficiency.

Institutional Quality

Most of the time when dealing with a globalization and liberalization, a good policy can be an important role in order to achieve an efficient of supply chain coordination. Inefficient ports, poor transport system and logistics services are not the only impediments for exporting and importing firms in developing countries. These firms also facing policy and institutional constraints in the forms of complex laws, burdensome regulations, inadequate enforcement of contracts, poor definition and enforcement of rules of engagement, onerous documentation and other procedures causing delays at customs and border crossings, pilferage in transit, and highly restrictive protocols on movement of cargo (Subramanian, 2001). Besides that, Anderson and Marcouiller (2002), have studied the effects of institutional quality on trade where they have find that higher transactions costs associated with poorly enforced commercial contracts and lack of transparency and impartiality in government policies significantly slow down the international trade. They also find that by 10 percent increase in a country's index of transparency and impartiality leads to a 5 percent increase in its import volume.

De Groot et al, (2004) examine institutional quality which reflected by such dimensions as effectiveness of governance, regulatory quality, voice and accountability, rule of law, and control of corruption. They find a positive and significant link between improved regulatory quality and increment in bilateral trade. The LPI result has shown that good policies matter give impact to developing an efficient supply chains but many developing countries still lag behind to provide a better development. The "logistics gap" evident in the research still prevails and underscores the importance of consistent policies across sectors (trade, customs, and transportation). The imperative of facilitating trade through more transparent and consistent border clearance is now universally recognized and because of that the importance of efficient logistics is now widely accepted by policymakers worldwide (World Bank, 2014).

Conclusion

The literature on the effect of reforms in supply chain efficiency towards trade liberalization shown the evidences that issues and challenges from the failure to provide a better development on infrastructure, logistics services, cost competitiveness and institutional policy can give a critical constraint to support the efficiency of supply chain in a developing country. Countries will mainly being affected from the lack of effective player in competitive global and regional market which encounter from such issues and barriers that cannot be eliminate or improvise by the government. Consequently, by improving the infrastructure, logistics services, trade cost and institutional policy towards trade, the development and operation of

efficient supply chain can be supported and also can help to boost the trade competitiveness of developing countries thus increase the export prospective for economic prosperous. Thus, these papers are based ongoing study that will continue to develop a perception and measurement on supply chain efficiency performance in Malaysia towards trade liberalization and how to strategize a better supply chain efficiency for Malaysia in facing the trade openness in 2015.

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THE DETERMINATION OF KEY FACTORS FOR A FEASIBLE RO-RO SHORT SEA SHIPPING OPERATION

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Abstract:
The purpose of this paper is to determine the key factors for a feasible inter-state Ro-Ro Short Sea Shipping (SSS) that would be introduced in the Brunei, Indonesia, Malaysia and Philippines East ASEAN Growth Area (BIMP-EAGA). Although the literature has addressed a myriad of important factors through research conducted particularly in Europe and North America, the identification of the more significant determining factors for a feasible SSS operation is expected to assist SSS investors and authorities of the BIMP-EAGA countries to focus their resources on a few significant factors that could enable the introduction of a feasible SSS service in the sub-region.

Keywords: AHP, Delphi, Ro-Ro SSS, BIMP-EAGA, ASEAN, pair-wise comparison.

Introduction

Until today, there is no strict definition of short sea shipping (SSS) from the aspects of types of vessel used, distance travel or types of cargo or passenger transported. However, from the official definition adopted by the European Commission and the Maritime Administration (MARAD) of the United States (U.S), the focus of the SSS concept in both the European Union (E.U) and the U.S is for the movement of cargo whilst at the same time the services could be utilised for the efficient movement of passengers through coastal waters and inland waterways (EC, 1999; MARAD, 2014). Gleaning through the literature on SSS, it can be generally defined as “the movement of goods and people within internal and coastal waters that does not involve a transit through the ocean”. From the preceding definition, SSS services may involve all types of vessels such as feeder container vessels, tug and barge system, Roll-on Roll-off (Ro-Ro) vessels, passenger ferries, handy size bulk carriers and tankers as well as other suitable vessels. However, this paper attempt to only explore the feasibility of Ro-Ro SSS operation in Brunei, Indonesia, Malaysia and Philippines East ASEAN Growth Area (BIMP-EAGA) since earlier studies have identified Ro-Ro as the most suitable and efficient type of vessels for the transportation of cargo, passengers and vehicles simultaneously in a SSS operation (Kennedy, 2008; Medda and Trujillo, 2010; Sambracos and Maniati, 2012).

SSS that had started to decline since the 20th century due to the increased efficiency in road transportation and the introduction of airliners has now found a new role due to the rapid growth of road freight transportation over the last three decades. This uncontrolled growth has led to the increase of road transport inefficiency due to higher congestion, high construction and maintenance cost of road infrastructure, pollution, accidents and high operational cost. In light of the re-emergence on the popularity of SSS beginning early 1990s, many studies have been conducted on SSS as an alternative mode to road transportation particularly in Europe and North America. Among the notable studies are Baindur and Viegas (2011) that identify critical factors and barriers for establishing a successful European SSS project as well as Medda and Trujillo (2010) that identify the main determinants for SSS success in Europe. In North America, Yonge and Henesey (2005) examine the factors that are important in the development of SSS decision tool. Similarly, Perakis and Denisis (2008) and Kennedy (2008) attempt to identify the prospect of SSS in the U.S by highlighting the major inhibitions that must be overcome. In spite of the significant number of studies conducted in Europe and North America, similar studies on SSS in Southeast Asia in general and in the BIMP-EAGA sub-region in particular are very limited and difficult to trace through the open literature.

Aim

In light of the increase importance of SSS in many parts of the world and the effort by BIMP-EAGA countries to introduce inter-state Ro-Ro operation to enhance physical connectivity within the sub-region, this paper aims to identify the important determinants for a feasible inter-state Ro-Ro SSS operation from the perspective of its prospective stakeholders. This study is expected to contribute to the existing literature through the identification of the important factors that will contribute to a feasible inter-state Ro-Ro SSS operation particularly for BIMP-EAGA sub-region and their relative importance.

Literature Review

BIMP-EAGA

BIMP-EAGA was established in 1994 to address the economic and social development of the less developed and more remote area of the Association of Southeast Asian Nations (ASEAN) member states (except for Brunei Darussalam) with initial focus primarily through increased trade, investment and tourism, and ultimately through economic diversification beyond resource extraction. It is a sub-national growth area which is significantly less physically connected as it consists mainly of island economies and trade much more with the rest of the world, usually via capital ports, than within the sub-region. Due to the nature of its geography, Norojono and Lidasan (2005) describe the intermodal transport system of the BIMP-EAGA sub-region as being anchored more on maritime transport. From one's observation on the map of the sub-region, one could notice that the sub-regional intermodal transport system is primarily maritime-based and supported by a land-based transport system in the island of Borneo that links the EAGA provinces of Indonesia and Malaysia (Norojono & Lidasan, 2005). Geographically, the sub-region covers the entire sultanate of Brunei Darussalam; nine provinces in Kalimantan and Sulawesi, the island chain of Maluku and Papua (Indonesia); the federal states of Sabah and Sarawak and the federal territory of Labuan (Malaysia); and the entire province of Mindanao and the island province of Palawan (Philippines). These areas are among the poorest in their respective countries; but they are linked by a long history of trade and economic relations which has been going on for centuries with barter as a major form of trade until a few decades ago (BIMP-EAGA, 2012).

Asean ro-ro concept

In support of the establishment of an integrated, efficient and competitive maritime transport system, one of ASEAN key actions is to establish efficient and reliable shipping routes that include Ro-Ro vessels. The shipping routes would connect mainland and archipelagic Southeast Asia in support of BIMP-EAGA and other sub-regional initiatives (ASEAN, 2011). In support of the ASEAN Ro-Ro concept, the 5th BIMP EAGA Transport Ministers Meeting (TMM) welcomes the conduct of a study on BIMP-EAGA Ro-Ro network which may form part of an ASEAN Ro-Ro network (MPAC, 2011). The 2nd BIMP-EAGA TMM (2007) had given their commitment to intensify cooperation to realize the sea linkages priority projects connecting the ports of BIMP-EAGA member countries.

Important determinants for a feasible sss

Thus far, most of the contemporary research studies concerning SSS that could be traced centred on the SSS operations in Europe and North America. Among others, in order to embark on a successful SSS operation, Psaraftis and Schinas (2000) recommends further cooperation among various transportation modes, alliances among ports and the development of common system for freight transportation data. In evaluating the strengths and weaknesses of SSS in Europe, Paixao and Marlow (2001) reveal that the weaknesses are mostly due to the lack of efficient port operations, unreliable vessel schedules, excessive paperwork and high administrative cost. However, they espouse that SSS provides environmental benefits, lower energy consumption, economies of scale and lower costs required for infrastructure expansion (Paixao & Marlow, 2001). Similarly Medda and Trujillo (2010) in their analysis on the determinants of SSS argue that SSS is considered to be one of the most sustainable and economically competitive modes of transport due to its higher fuel economy and lower emissions of harmful pollutants. Their research is supported by Sambracos and Maniati (2012) that concludes that SSS produced considerably lower external cost with savings of 41.63%, 60.13% and 6.78% in the case of air pollution, CO2 emission and natural/landscape destruction respectively.

In their study on the economics of SSS, Musso and Marchese (2002) argue that in order to determine the competitiveness of SSS, both the internal and external costs must be included. They also theorize that SSS competitiveness depends directly on sea-leg distances, which would be a very interesting factor to examine due to various lengths of the sea-legs identified in the BIMP-EAGA SSS study (Musso & Marchese, 2002). Similarly Medda and Trujillo (2010) argue that SSS is competitive for a certain types of distance, product and with certain types of ships. In their subsequent research, Paixao Casaca and Marlow (2005) examine the competitiveness of SSS compared to other transport modes and reveal that the quality of service provided by SSS service providers in Europe and the image of SSS relative to other modes of transport are still poor. In another study of SSS and European Motorways of the Sea (MoS) concept, Baindur and Viegas (2011) have identified the barriers to the success of SSS and grouped them into regulatory, technical, commercial and environmental. In the Baltic, Tananinem et al. (2012) in their interviews with SSS and logistics service providers along the Helsinki-Tallinn route conclude that the Ro-Ro and passenger (Ropax) concept is the only economically profitable solution along such route, without which higher prices of tickets would be detrimental to the effort to capture higher cargo and passenger traffics.

In North America, Yonge and Henesey (2005) through data obtained from their literature review, interviews and questionnaire survey develop a SSS decision tool specifically for a particular port in the United States through the weighting of various factors and their sub-factors using the scale between 1 (poor) to 5 (excellent). Through this weighting, they espouse that demand, geographic location, infrastructure capability and intermodal connectors are the four most important factors for Port Caneveral to operate a successful SSS operation (Yonge & Henesey, 2005). Perakis and Denesis (2008) in their examination of the prospects of SSS in the United States conclude that in spite of the wide acceptance of SSS among stakeholders, the obstacles to its successful implementation are additional handling costs, image problem, habour maintenance tax and restriction imposed by the U.S. Cabotage laws or Jones Act. They also espouse two types of SSS i.e. the utilization of Load-on Load-off (Lo-Lo) vessels or container barges as a solution to terminal inefficiency problems and Ro-Ro ships as economical and reliable way for truck trailer transportation in the U.S. east and west coasts, Gulf of Mexico and the Great Lakes. This is due to the economies of scale and fuel efficiencies of Ro-Ro (Perakis & Denisis, 2008). Similar U.S. domestic inhibitions to the development of SSS involving the cabotage laws were also discussed by Kennedy (2008).

Denisis (2009) in his study on the prospect of SSS in the U.S. argues that the major obstacles for its success are port inefficiencies, lack of communication among shippers and shipowners, as well as legal and administrative constraints. In a study involving Ro-Ro vessel in the U.S., the National Ports and Waterways Institute discovers that the use of Ro-Ro vessels appears to be very competitive compared with the truck mode due to the high external costs of trucks in the U.S. east coast region (National Ports and Waterways Institute, 2000; Denisis, 2009). On the other hand, a study conducted by the U.S. Merchant Marine Academy on a proposed Ro-Ro vessel designed to carry 80 tractor-trailers reveals that Ro-Ro is cheaper than the truck's freight rate for distances longer than 200 miles if terminal and port fees are excluded (Lombardo, 2010).

In their study on SSS in Brazil, Medina et. al. (2011) theorize that the obstacles to a successful SSS operation are high cost of bunker fuel, delayed compensation for freight surcharge, problems in ship financing and high operating cost of Brazilian flagged vessels. In another part of the southern hemi-sphere, Everett and Kittle (2010) in their examination of the decline of SSS in Australia have identified lack of government policy, high operating cost due to cabotage restrictions and lack of integrated transport model as the reasons. Closer to BIMP-EAGA sub-region, a number of studies in the Philippines identify both the costs and inefficiency of cargo handling charges as a major factor in the high cost of domestic logistics inter-islands transportation and recommend the use of Ro-Ro shipping to replace the earlier Lo-Lo shipping (ADB, 2010). In ASEAN, a Ro-Ro SSS feasibility study was conducted on three routes namely Dumai-Malacca, Belawan-Penang-Phuket and Davao-General Santos-Bitung in 2012 (JICA, 2013). Due to the differing conditions of ports, routes and local demands, the study recommends the first two routes to embark on the Ro-Ro projects. As for the third route, it needs intensive demand finding and boosting measures to scarce existing traffic along the route (JICA, 2013). The survey data were processed using a financial analysis involving three important variables namely demand forecast, operation plan and ship procurement cost (JICA, 2013). In summary, the important determining factors gleaned through the literature are presented in Table 1

Authors / Factors	Medda& Trujillo (2010)	Casaca & Marlow (2006)+ (2001)	Brooks & Frost (2006)	Gros-so et al (2009)	Baindur & Viegas (2011)	Tapani-nem et al (2012)	Perakis & Denisis (2008)	Chen & Lirn (2012)	Kruse et al (2004)	Musso & Mache-se (2002)	Lombar-do (2004)	Norojo -no & Lida-san (2005)
Promotion of SSS	✓	✓	✓	-	-	-	✓	✓	-	✓	✓	-
Regional agreements to relax shipping restriction	✓	-	✓	-	-	-	-	-	✓	✓	✓	✓
Coordinated administrative/CIQS formalities	✓	-	-	-	-	-	✓	-	-	✓	-	-
Good intermodal links	✓	✓	-	✓	-	-	✓	✓	✓	✓	✓	✓
Govt assistance at initial period/ start-up funding	-	-	✓	-	✓	-	-	-	-	-	-	-
Good port access	✓	✓	-	✓	-	-	✓	✓	✓	✓	✓	✓
Large payload or shipment volume	-	-	-	-	✓	✓	-	-	✓	✓	✓	-
Balance payload or shipment volume	-	-	-	-	✓	✓	-	-	✓	-	-	-
Weather & meteorological condition	-	-	-	-	✓	✓	-	-	-	-	-	-
Adequate port facilities & equipment	✓	✓	-	-	-	✓	-	-	-	✓	✓	✓
Suitable ship's type relative to payload, distance & speed	✓	-	-	-	-	✓	✓	-	✓	✓	-	
Port efficiency	✓	✓	-	✓	-	✓	✓	-	✓	✓	✓	-
SSS service quality	-	✓	-	-	-	✓	✓	✓	✓	✓	-	-
Harmonization of admin procedure among ports	✓	✓	-	-	✓	-	-	-	-	-	-	✓

Table 1: Important factors for a feasible SSS Operation

Research methodology

The Analytic Hierarchy Process (AHP) is a type of Multi-Criteria Analysis instrument normally used for complicated and unstructured problem. The instrument that was developed by Saaty in 1980 is an approach that uses hierarchical model having levels of goal, criteria, sub-criteria and alternatives (Saaty, 2008). It has been described as an easy and useful methodology to enable a pair-wise comparison within the analyst area of expertise to be done (Oguztimur, 2011). AHP uses the concept of paired comparison and hierarchical structure or network analysis for the selection of the most appropriate alternative among a set of feasible alternatives (Saaty, 1997). The primary goal of an AHP is to select an alternative that best satisfies a given set of criteria out of a set of alternatives or to

determine the weight of the criteria in any application using the decision maker's or expert's experience or knowledge in a matrix of a pair-wise comparison of attributes (Saaty, 2008). In decision making, AHP emphasizes on the requirements to (1) identify the problem to be addressed; (2) the purpose or objective of the decision; (3) the criteria and sub-criteria to be analysed; (4) the stakeholders and groups that will be affected by the decision making; and (5) the alternative actions available (Saaty, 2008).

Key factors for the AHP survey

The first step in the research design involves identifying the main determining factors for a feasible SSS operation through the review of contemporary literature. The literature review has an extensive list that can be grouped into 14 factors as listed in Table 1. However, as not all the factors identified may be imperative for the success of interstate Ro-Ro SSS in BIMP-EAGA sub-region as in Europe or North America, a Delphi technique is adopted to allow stakeholders to determine the more important factors among the list of 14 and to identify other important factors that are not addressed by the literature but considered as imperative by the stakeholders for the success of SSS operation in BIMP-EAGA sub-region. The Delphi is a method that requires knowledgeable and expert contributors individually responding to questions and submitting the result direct to the coordinator who would process the answers looking for central tendencies and their rationales (Grisham, 2008). This technique was first developed by RAND corporation in the U.S in 1950s in order to assess variables that are intangibles or covered in an uncertainty by drawing on the knowledge and abilities of a diverse group of experts through a form of anonymous and iterative consultation (Grisham, 2008). Four key features that need to be adhered in the Delphi procedure are the anonymity of Delphi panels, iteration that allows panellists to refine their views, controlled feedback and statistical aggregation of group response that allows for quantitative analysis and interpretation of data (Rowe and Wright, 1999).

Due to the limited number of experts in maritime transport within the BIMP-EAGA sub-region, Delphi is found to be a more appropriate technique compared to other techniques such as factor analysis and brainstorming as there is no minimum limit of expert numbers stipulated for Delphi technique. A literature review performed by Skulmoski et al. (2007) found that a sample size of between 4 to 171 have been used in Delphi research. Similarly, a survey on successful PhD research between 1981 to 2006 discovered that the sample size used was between 8 to 345 panels (Skulmoski et al., 2007).On the hand, other techniques that are normally used to limit the number of factors are factor analysis and brain storming (da Cruz et al., 2013). Factor analysis requires a large sample, with a minimum of 200 respondents for a fair result whilst brain storming may not be possible due to the difficulty in assembling the expert respondents from four BIMP-EAGA countries together (MacCallum et al., 1999).

Initial result

From the initial feedbacks received from respondents in Round 1 Delphi questionnaire survey 13 out of 14 determining factors have been considered as Important (Likert Scale 5) or higher. Only "Regional agreements to relax shipping restriction" has been considered as moderately important. Five factors received close to Likert scale 6 (Very Important). Those factors are "Good intermodal links", "Balance payload or shipment volume", "Adequate port facilities and equipment", "Port efficiency" and "SSS service quality". On the other hand, a new factor i.e. "Security Perception" particularly in the waters of East Sabah and Southern Philippines has been considered as another important determining factor by two of the respondents. Adapting from the guideline given by Baindur and Viegas (2011) that classify the determining factors for SSS into four main groups, those factors can be included into an AHP model as in Figure 1. Once a consensus has been achieved on the important determining factors for a feasible Ro-Ro SSS operation in the next round of Delphi survey, the respondents will be subsequently requested to conduct pair-wise comparisons between all the factors (Saaty,1994).

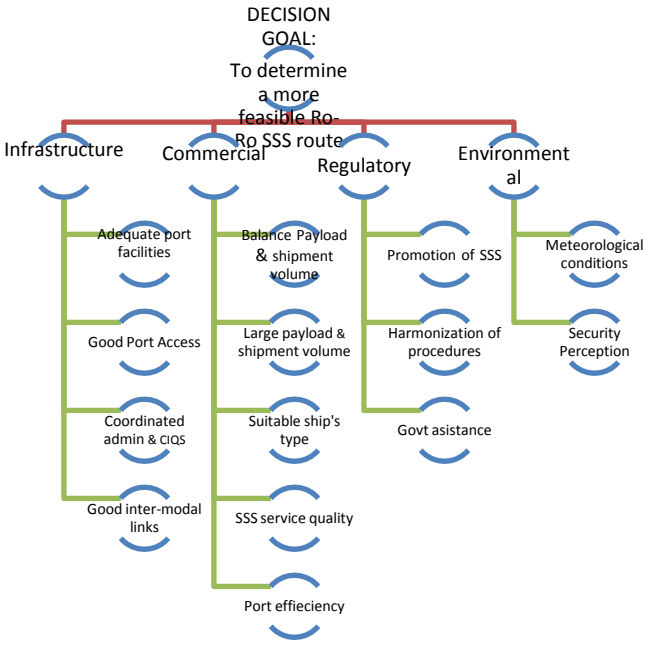

Figure 1: AHP Decision Making Model For Ro-Ro SSS

Conclusion

As a part of the less developed sub-region of ASEAN, the introduction of Ro-Ro SSS routes connecting the ports of the BIMP-EAGA member countries is a pre-requisite to the enhancement of physical connectivity within the sub-region. Learning from the failure of the first BIMP EAGA Ro-Ro SSS operation connecting Muara, Brunei to Menumbok, Malaysia, it is necessary that a systematic decision making model to enable for feasible SSS operations to be established within the BIMP-EAGA sub-region. Hence, it is hoped that this AHP decision making model for interstate Ro-Ro SSS will assist government decision makers and investors to identify the prospect of their SSS endeavours within the sub-region.

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THE MAJOR FACTORS CONTRIBUTING TO ROAD DAMAGES OF FEDERAL ROADS IN MALAYSIA

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Abstract
High quality roads are among the most important public assets that contribute to economic growth in many countries. However, road damages are challenges that seek to inhibit the function of the roads; hence, it constitutes a concern to the authorities and road users. The clarification on the main factors contributing to road damages is essential to understanding the remedial measures and lasting solutions. In identifying the criticality of the factors responsible for road damages, careful triangulation and review of extended literature and questionnaire survey is done on the road users in Malaysia. The findings in this research are based on data analysis of 500 useable questionnaires received. According to the results based on the questionnaires, roads users establish that overloading of vehicles is the major cause of road damages.

Keywords:- federal roads; overloading; questionnaire; road damages; road users

Introduction

The causes of roads damages in Malaysia are still not properly identified and the actual factors of damages are yet to be fully explored and analyzed. The lack of certainty of the causes of road damages adds a great loss to the country as the research for the main cause of road damages lingers on.

Most of the comments from road users are associated with the damages that occur on the roads due to the overloading and heavy vehicles using these roads (Bavani, 2010; Kordi *et al.,* 2012). However, contrary to the prevalent literature and the other road users' speculations, the Pan Malaysia Lorry Owners Association (PMLOA) objects to the fact that trucks do not pose any risk to other road users or damage to the roads (Bavani, 2010).

To explore, assess, analyze and confirm the claims, this study conducted a questionnaire to explore the opinions of the road users regarding the performance of the roads in Malaysia and the main factor that influences roads damage.

Research Methodology

This research employs post positivist paradigm (Goodier *et al.,* 2010); hence, uses a questionnaire survey to conduct systematic data collection method from the appropriate population (Stockton *et al.*, 1999). The purpose of the questionnaire survey is to collect the quantitative information through the structured and standardized questionnaire (Stockton *et al.,* 1999).

The population for the study consists of all the roads users who have used federal roads and highways in Malaysia. The respondents have been selected randomly to avoid bias an opinions (Denscombe, 2010) from the maintenance companies, heavy vehicle agencies, Ministry of Public Works and the normal roads users.

The Design of Questionnaire

The questionnaire was formulated from critical review of extant literature to address the objectives of this research, which is to abtain the data which can be used to statistically test the hyphotheses in the structural equation modelling (SEM) – (the model is not included in this research). However, this research presents only the descriptive data analysis from the 500 responses received from the questionnaire survey. Pilot study has been done to varify of the content (Fellows and Liu, 2008), format and question sequence of the questionnaire through face-to-face interviews with ten (10) experts from various backgrounds of road users (pavement specialist, statistic lecturer, researcher). The experts were also asked to review the quality of the questionnaire. All the comments received were reviewed and considered to develop the finalized questionnaire.

The questionnaire is divided into nine (9) sections. The first section (demography) contains the background of the respondents; such as gender, age, driving experience and type of vehicle they use. The demographic information is important to get an idea about the experience the respondent on the roads condition (Stockton *et al.*, 1999). The rest of questionnaire consists of 37 variables on the factors responsible for causing road damages. The road users perceptions were measured on a five-point Likert scale where 1 represents 'strongly disagree' and 5 for 'strongly agree'. The questionnaire required the respondents to rate the major factors that contribute to road damages in the areas such as traffic volume, loading and climatic effect. This questionnaire also needed respondents to rate the effect of an accident due to roads damage in term of waste. The last part of the questionnaire asks their level of satisfaction of the road infrastructure and their overall feeling when using the federal roads.

Data Collection

The data was collected using the combination of electronic (Flintsch and McGhee, 2009) and face-to-face surveys (Sproull, 1986). However, the main method for this survey is electronic method. The electronic method was via e-mail and they will answer the questionnaire through web-based questionnaires (Denscombe, 2010; Griffis *et al.,* 2003). There are several advantages of using the web-based rather than postal questionnaire such as it can reduce the cost of postal questionnaire, more attractive design and the result are collected and downloaded straight into the database in Microsoft Excel without entering wrong details at the data entry stage into SPSS18 (Denscombe, 2010; Shehu and Akintoye, 2010).

Total Responses Received

A total of 500 useable questionnaires were received and analyzed. According to Hair *et al.* (2011) and Nunnaly (1978) cited by Lee and Yu (2012), in structural equation modeling, the sample size should at least 10 times the number of variables. However, many researchers (Field, 2009; Pallant, 2010) advocated that the higher the response rate in surveys, the better the results. In this study, the sample size is larger than 10 times of number variables, thus it was sufficient for factor analysis (Ling and Ng, 2011; Lee and Yu, 2012).

From the 1202 questionnaires distributed by email, a total of 30.8% of the questionnaires sent were completed, returned and received. Face-to-face questionnaires were also distributed to reach the road users that do not have access to Internet. The whole 100% of face-to-face questionnaires were completed and returned. It appears that for the online survey, the respondents are more comfortable answering the online questionnaires during office hour, as they respond to the e-mail immediately. If the e-mail is sent during weekends (Saturday and Sunday), it is found that the number of questionnaires returned is low because normally the respondents are not on the internet. For the face-to-face questionnaires, the respondents completed the questionnaire on the spot, therefore, there was no problems associated with loss or unreturned questionnaires.

Results And Discussion

Data Sample Characteristics

From the demographic information, the composition of the gender of the respondents was 250 males and females (50% each). A total of 53.6% of respondents are 21-30 years old of age and the majorities (42.2%) of respondents have more than 10 years driving experience. The respondents' year of experience in driving is an essential determinant of their level of knowledge and experience of road condition. Furthermore, most of them are working as professionals, engineers, academicians, logisticians and executives. Therefore, their opinions and knowledge can be applied. Among the respondents, 84.4% use car or taxi as their transport. The descriptive statistics relating to the respondents' profiles are shown in Table 1.

Variable	Frequency	%	Variable	Frequency	%
1. Gender			*3. Driving experience (years)*		
Male	250	50	<1	24	4.8
Female	250	50	2 – 4	84	16.8
2. Age (years)			5 - 7	102	20.4
<20	8	1.6	8 – 10	79	15.8
21 – 30	268	53.6	>10	211	42.2
31 – 40	122	24.4	*4. Type of vehicle used*		
41 – 50	64	12.8	Motorcycle	62	12.4
51 – 60	38	7.6	Car or taxi	422	84.4
>61	0	0	Van or utilities	7	1.4
			Bus	4	0.8
			Medium lorry	4	0.8
			Heavy lorry	1	0.2

Table 1: Profile of Respondents (N=500)

Reliability And Normality Tests

Prior to any statistical analysis, reliability of the data was checked to determine the reliability, where a reliability test was conducted. In the reliability analysis, the Cronbach alpha value is used as the indicator for the internal consistency to check whether the scales used for data collection are reliable or not (Pallant, 2010). The coefficient of Cronbach alpha is between 0 and 1. However, the reliable value is above 0.7 (Aripin, 2009; Pallant, 2010). In this test, the Cronbach alpha value is ***p = 0.806***, which is considered sufficient (Field, 2009) and preferable (Pallant, 2010). Therefore, the 37 questions are consistent and thus, reliable for measuring the factors influenced in the damages and satisfaction of roads users.

Having been successful in the reliability analysis, normality test is subsequently conducted to determine the characteristics of the data (whether parametric or non-parametric) (Field, 2009). Test of normality is used to determine the scores distribution on the dependent variable is 'normal' (Pallant, 2010). If the data distribution is normal, parametric tests are applicable (Aripin, 2009). In this study, the normality test has been conduct using Explore option technique of the Descriptive menu. The normality value of non-significant result achieved when a 'sig. value' in the table labeled 'Test of Normality' is more than 0.05. However, in this study the result of sig. value is 0.000. This means that the distribution is non-normal (hence, non-parametric) because the majority of the respondents answer of low (1=strongly disagree) or high (5=strongly agree) in the Likert scale. However, according to Pallant (2010), this is quite common in larger samples.

T-test Between Engineers And Others

To check the validity of data in term of bias between engineers and other road users that constitute invalid data, *t*-test has been conducted by independent samples to test whether the mean score between these two groups is equal to a predicted value (Pallant, 2010). Groups of engineers are selected because they are considered experts and have highly technical knowledge in relation to pavements, also as a part of a team involved in the program to maintain roads (Markow, 2007). In this test, all the values of significance level (2-tailed) were above 0.05 (see Appendix A). As the values were above the required cut-off of 0.05, this means that there was no statistically significant difference between the opinion of engineers and other road users.

Critically Index For Critical Factors

Having conducted the reliability and normality tests, the research proceeds with further analyses of the data using criticality index. The indexing ranks the major factors influence the roads damages. Therefore, to determine the relative critical index of the listed factors, this study uses formula developed by Odeh and Battaineh (2002), while the analysis uses the weighting scale uses by Cheng (2002). Cheng uses the weighting of the importance index from 0.00, 0.25, 0.50, 0.75 and 1 (Shehu and Akintoye, 2010). In this approach, the weighting substitutes the position of the Likert scale. The maximum criticality index is 1,

therefore, any factor with the highest value between 0 ≥ 1 are considered critical. Equation (1) shows the formula for calculating relative criticality index.

$$C_{rd} = \frac{\sum_{i=1}^{5} W_i X_i}{\sum_{i=1}^{5} X_i} \qquad (1)$$

Where:
C_{rd} = Criticality Index for major factor of roads damage.
i = responses category index = 1,2,3,4 and 5 (position on the Likert scale).
W_i = is the weight assigned to ith response = 0, 0.25, 0.5, 0.75 and 1 respectively (Cheng, 2002)
X_i = frequency of the ith response given as percentage of the total responses for each cause (Odeh and Battaineh, 2002)

By evaluating the data collected using Equation 1; the respective criticality indices are calculated. Table 2 presents the exploratory and descriptive data for the criticality index and mean. Given that the questionnaire ranged from 1 (strongly disagree) to 5 (strongly agree), higher mean scores reflect responses that indicate higher criticality for the major factor of roads damages. The interpretation of the criticality indices is as follows (Shehu, 2008):

1. 0.00 – 0.25 Weak
2. 0.26 – 0.50 Moderate
3. 0.56 – 0.75 High
4. 0.76 – 1.00 Very high

Assessment items	Variables	Critically index	Rank
Loading			
Overloading vehicles is a major cause of road damage.	L2	0.821	1
Heavy vehicles are driven slowly because they carry heavier loads.	L3	0.820	2
Increasing the load limit will reduce the life span of the roads.	L4	0.769	3
Heavy vehicles that use the roads are always overloaded.	L1	0.759	4
Traffic volume			
Federal roads in Malaysia are no longer capable of withstanding additional traffic volume.	TV2	0.725	1
Traffic volume on federal roads is higher than tolled roads.	TV3	0.716	2
High traffic volume of vehicles contributes to damage.	TV1	0.699	3
Road users prefer to use federal roads compared to tolled roads.	TV4	0.617	4
Climatic effect			
The type of soil used in construction of the road may affect the strength of that road.	CE4	0.800	1
The road materials used in Malaysia can be easily damaged when continually exposed to water and flooding.	CE2	0.794	2
Alternating weather conditions (heavy rain followed by heat and vice versa) cause damage to the roads.	CE3	0.762	3
Heavy rainfall weakens the road structure.	CE1	0.717	4
Roads damages			
Cracking on the road surface increases uncomfortable feelings during driving.	RD2	0.927	1

Damaged roads can cause accidents.	RD3	0.911	2
Damage roads can cause traffic jams as drivers need to drive slowly.	RD4	0.900	3
Heavy vehicle on the road induced the road damages.	RD5	0.881	4
Low vehicle speed increases the longitudinal deformation (rutting) of road surface.	RD1	0.542	5
Accident			
Accidents cause damage to vehicles.	ACC4	0.943	1
Accidents cause delays to other road users.	ACC1	0.936	2
Accidents cause injuries to drivers and passengers.	ACC5	0.919	3
Accidents cause injuries to victims.	ACC6	0.918	4
Accidents cause trauma to victims.	ACC3	0.906	5
Accidents cause damage to road facilities.	ACC2	0.827	6

Table 2: Major Factors of Roads Damages

The major categories of factors that contribute to road damages are divided into three, which are (i) loading, (ii) traffic volume and (iii) climatic effect (Saraf *et al.*, 1995; Wong and Ruban, 2010; Kordi *et al.*, 2011; Shahid, 2011). To look at the most critical factor of each category, the criticality index and mean ranking have been conducted separately.

Main factors of road damages

According the questionnaire responses based on the category of **'loading'**, *'overloading vehicles is a major cause of road damage'* and *'heavy vehicle are driven slowly because they carry more loads'* were the most loading with same the criticality index of 0.82. From these results, road users believe that loading is the major factor contributing to the damages because normally the damages occurred on the left lane in which heavy vehicle use this lane due to carrying more load and driving at a low speed; thus, distribution or spreading of load become greater (Marshek *et al.*, 1986; Gillespie and Karamihas, 1994; Kordi *et al.*, 2012).

In the category of **'traffic volume'**, respondents believe *'federal roads in Malaysia are no longer capable of withstanding additional traffic volume'* with 0.73 critically index as a highest ranked in this category. The lower loading is on *'road users prefer to use federal roads compared to tolled roads'*. This result is not surprising because tolled expressway are better maintained and well performed than federal roads (Mansor, 2010). Road users do not mind paying tolls as long as they feel comfortable while driving.

The highest factor that affects road conditions is under **'climatic effect'** is *'the type of soil used in construction of the road may affect the strength of that road'* (*Crd* = 0.80); followed by *'the road materials used in Malaysia can be easily damaged when continually exposed to water and flooding'* with 0.79 critically index. In nature, roads performance can be affected by climatic change. Therefore, it is important to construct and use high quality materials to ensure the roads can withstand the effects of the climate. According to Carrera *et al.* (2009), climatic change influences the performance of roads because the current design theory and construction techniques are based on the current climate. Therefore, if the future climate changes, the design and construction method also needs to be amended to suit the climate.

Road damages effect to accident and waste

The main priority for drivers when driving is the road condition because the result shows the highest factor in the category of road damages is *'cracking on the road surface increases uncomfortable feelings during driving'* which has 0.92 criticality index. Drivers have to slow down their vehicle to avoid damaged roads; hence, causes traffic congestion.

In this research, it has been hypothesized that damage to roads can lead to accidents, and respondents believe that *'accidents cause damage to vehicles'* and *'accidents cause delays to other road users'* which has the same result of criticality index of 0.94 in category of accident. According to Ramli (2012) and

Yaacob (2010), normally victims do not notice road damaged (pot holes) especially during heavy rain and at night; thus, causing injuries and trauma to victims.

Road damages also cause waste in term of time and financial as respondents state *'severe road damages take some time to be repaired by maintenance company'* when this factor was ranked first in the category of waste with critically index of 0.83 whereas *'government spends a lot of money for maintaining/repairing the damaged roads'* to improve the roads performance in Malaysia is the lowest factor of waste with 0.72 critically index. These results indicate that respondents feel maintenance company are slow to take action to repair damaged roads and the lack of assistance from the government for maintaining roads in term of financial. However, this contradicts with the reports from Hamzah (2011); Hasam *et al.* (2010); Yusuf (2011) which stated the government has invested a lot of money to ensure the quality of roads in Malaysia is at a satisfactory level.

Maintenance
Water can weaken the road structure. Proper drainage system is very important to ensure water can flow quickly into the drain to prevent water being absorbed into the road structure (Dawson *et al.*, 2009). Therefore, 54% of respondents strongly agree and 39.8% of respondents agree that *'proper maintenance of drainage system may reduce the problem of roads damages'* which has the highest loading in the category of maintenance with 0.87 critically index. The second highest loading under this category is *'regularly maintenance increase roads life span'* (*Crd*=0.87). Burningham and Stankevich (2005) indicate that regular roads maintenance is important to prevent roads rapidly falling into disrepair and avoiding high cost for rehabilitation. Poor roads maintenance may increase accident rates and property cost; therefore, to sustain good performance of roads, a schedule of road maintenance must be well-planned and organized (Burningham and Stankevich, 2005).

Road users satisfaction
Overall, roads users feel that it is *'interesting to drive on the federal roads'* with 0.50 critically index. The factor ranked high in the critically assessment, however it scored low under the satisfaction factor. Roads users still have unsatisfied feelings with the performance of federal roads in Malaysia when the factor is located at a low rank of 0.40 critically index. The result indicates that, road conditions in Malaysia are at worrying stage when the majority of road users are unhappy with the quality of the roads. Therefore, the responsible authorities should seek alternatives to amend this problem before the situation became worse.

Conclusion
There are three categories of factors contributing to road damages, which are loading, traffic volume and climatic effect. However, respondents believe that loading is the main factor influencing the road damages in Malaysia, as two of the criticality indices are 0.82. It has also been established that the roads users agree that proper and regular maintenance can mitigate the damaging effect on the roads. It has also been inferred that the type of soil, materials used in road construction, alternating weather conditions and rainfall are critical factors that contribute to road damages. Subsequently, in analyzing the effect of road damages, it has been established that the respondents did not only indicated that the roads are uncomfortable to drive on, but also cause traffic jams or even accidents.

A careful consideration of the responses also reveals that bad road conditions can cause accidents on those roads. If occurred, accidents can cause delays to other road users, damage vehicles, injuries to parties (drivers and passengers) and damage road facilities. To confirm if road damages or accidents cause any waste, the respondents voted strongly that not only drivers spend a lot of money to fix their vehicles, but also severe road damages take long time to be fixed, they (damages) cost a lot of money to fix and it opens an avenue for misappropriation by the maintenance companies (by doing substandard work).

In a bid to assess the satisfaction of the road users with the current state of the federal road, it has been confirmed that the level of satisfaction is relatively low; thus, improvement is not only necessary, but should be done immediately to make the roads enjoyable and safer. This development is also detrimental to the country which has invested a lot of money to ensure perfect road conditions.

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OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN MALAYSIAN TRANSPORT INDUSTRY: AN INSIGHT

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ABSTRACT

Purpose: This literary paper aims to provide an insight on the relevant risks, occupational hazards and work accidents; and occupational safety and health management system in transport industry in Malaysia.

Design/methodology/approach: This paper presents an in-depth literature review from various sources of publications and past previous research carried out on work hazards, road and work accidents in the transport industry and operations within Malaysian context.

Findings: Findings from this paper are presented as a summary on the deployment of occupational safety and health management system and the applicable OSH laws, standards and codes of practices for transport industry in Malaysia. The OSH codes of practices and guidelines, and OSH implementation is far from the expected standards. Adherence and enforcement are lacking in the actual transport industry as road and work accidents kept increasing. In conclusion, there is an urgent need to enforce OSH legal requirements, codes of practices and OSH management implementation, trainings and monitoring in accordance with the ILO Decent Work Agenda.

Research limitations/implications: This literary paper focuses and limits to occupational safety and health management system, road and work accidents in the Malaysian transport industry.The practical implication is to provide updates on the codes of practices on road and public safety, workers" health and welfare in transport industry; and the extent of these codes being implemented together with the OSH management system.

Originality/value: This paper provides inputs for potential variables and constructs for future research on occupational safety and health management in transport industry which is still new in Malaysia.

Keywords: occupational safety and health management, road safety, transport safety, occupational safety and health standards, codes of practices.

Introduction

Occupational safety and health management typically abbreviated as OSH management has long been in existence centuries ago even before the industrial revolution in the West (Goetsch, 2007; 2011; 2014). OSH management is still relevant and more so in the near future as it focused mainly on safety, health and welfare of staff, employees, workers or laborers at work in all industrial sectors and business organizations with economic gain (Shariff, 2011). Work safety is an important management aspect in all companies and is essential to protect working people from work accidents and accidents at workplace (Au Yong and Mohamad Zailani, 2011). Basically, occupational safety refers to work conditions, situations, tasks and activities, and whatever synonymous to these terms that are being carried out without any forms of danger or harm that may affect the health of a worker either at work or at a place of work (ILO, 1996 – 2014). Occupational health is a specialized area that is concerned with anticipation, recongition, evaluation and control of environmental stressors or factors in the workplace that may cause or inflict discomfort, sickness, illness or imparied health and well-being of the workers and causing occupational diseases (Shariff, 2011; Goetsch, 2011).

OSH management is applicable to ten industries in Malaysia as listed in the First Schedule of the Malaysian OSH Act, 1994, namely: 1) manufacturing; 2) mining and quarrying; 3) construction; 4) agriculture, forestry and fishing; 5) utilities; 6) transport, storage and communication; 7) wholesale and retail trades; 8) hotels and restaurants; 9) finance, insurance, real estate and business services and 10) public services and statutory authorities (OSH Act, 1996). OSH is legally enforced in 2000 after five years grace period given to these industries to comply with the OSH legislations, and to develop

their human capital such as training of the OSH officers,staff and workers; and to implement programs in compliance with these regulations (DOSH, 2013).

Literature Review

Occupational Safety Hazards

It is undeniable that work hazards and environmental stressors, risks and dangers are present at the workplace and work environment in all premises such as offices, workshops, laboratories, warehouses, working on the roads, air, land; and interacting with machines, vehicles, aircraft, equipment or appliances that are related to works of all kinds (NIOSH, 2008). Most heavy industries, improper work place design, ill-structured jobs, mismatch workers abilities with job demands, adverse working environment, poor human-machine system design and lack of management programs create occupational work hazards (Ashraf and Naseem, 2003). Some typical occupational safety hazards are slips and falls, impacts and collisions, falling objects and fall from heights, drowning and electrical hazards, to mention the common work hazards (Goetsch, 2011).Occupational work hazards (Ismail, et al. 2010; Goestch, 2011, Shariff, 2011) are commonly categorised as: 1) chemical hazards from fumes, mists, smoke, etc which are commonly present in chemicals, fertilizers and paints, manufacturing processes, labs, workshops, plantations; 2) physical hazards in the forms of noise, high pressures and vibrations, ionised radiations which are present in construction sites, airports runways, hospitals (x-ray/imaging, operation theatres), working with high-powered tools in road/builidngs/engineering works; 3) biological hazards in the forms of virus, bacteria, parasites commonly found in farms, veterinary, hospitals working with sick patients, and contacts wth the flora and fauna kingdom; 4) electrical hazards from electrical surge and short circuits; 5) mechanial hazards in activities dealing with machineries, cranes, boilers, pressure vessels and vehicles; 5) psychosocial hazards that are affect employees via human and social interactions such as work, peer, organizational pressures and work challenges and last but not the least; 6) ergonomics hazards affecting human body postures, repeated motions and excessive movements. Hazards at work place are aplenty as this is not the end of the list.

Occupational Health Hazards

OSH management is widely implemented in the first five industry sectors mentioned above; but not for the transport and storage, and business services. The Ministry of Human Resources in Malaysia quoted there were 55,208 workplace accidents reported in 2009, of which 20,814 cases were commuting to or from workplace, and 35,394 accident cases occured at the workplace (Au Yong and Mohamad Zailani, 2011; Harian Metro, 2010). From 2005 till 2014, there had been many express buses and public transportation involved in road accidents with increasing number of fatalities and serious injuries among passengers (MIROS, 2009; 2014; DOSH, 2013). Adding to the high increase of road fatalities, there were also other problems with too many express bus companies and problems on drivers shortages (Lee, 2014). Bus drivers also complained of working long hours, work fatigue and lack of facilities and welfare for them (Bavani and Lee, 2014; Lee, 2014). These factors lead to workers" health problems and work performances; thus causing organizational symptoms such as absentism, poor work quality and job disatisfaction (Dua, 1994). Over the last ten years, the issues of psychosocial risks and work-related stress in particular have gained increasing attention in many European countries and in Germany. This is mainly due to rising problems related to psychosocial risks (human suffering, stress, mental problems, burn out and economic losses) (WHO, 2012). Job stress is a global phenomenon and occur in both western and eastern work settings (Idris, Dollard and Winefield, 2010). Sources of work stress are multi-factors such as external (political, econonical), organzational (supervisors and management), tasks (demands and resouces) and individual factors (Idris et al, 2009). An estimated 160 million people also suffer from work-related diseases and estimated 270 million fatal and non-fatal work-related accidents per year where ILO estimated a total loss of 4% of the world's annual GDP as a consequence of these occupational diseases and accidents (Report VI, ILO 2003).

Work and Road Accidents

Nearly 0.5 million people die and up to 15 million people are injured in urban road accidents in developing countries each year, at a direct economic cost of estimated two percent of worldwide gross domestic product (World Bank Report, 2000). The number of commuting accidents over the years was increasing as reported in the Malaysian Social Security Organisation (SOCSO) with 22,040 cases (39 per cent of the total number of industrial accidents) (SOCSO, 2012). Commuting accidents were those involving employees on their way to and back from their workplace, when they were out for lunch break or travelling from one point to the other as required by their scope of duty. “Even though commuting accidents are reported as traffic cases but because it involves employees it is one of the

occupational safety and health problems" (Lee, 2011). Lee (2012) said Malaysians needed to set a higher benchmark at three to four cases every 1,000 workers, on a par with those in developed countries.Thus, human behaviour and lackadaisical attitudes towards safety must change for the better. The ongoing globalization of the world economies, accelerating world trade liberalization, rapid technological progress and significant developments in transport and communication and its consequences have been perceived as the major current driving force for changes affecting the world of work and OSH. Simultaneously, there has been underlying concern about the effects of demographic growth and dynamics, population movements and increasing pressures on the global environment too. As a result all countries are still undergoing profound structural adjustments which affect their economic, social and cultural fabric, safety and health of workers at large ILO (2014). Henceforth, this literary paper aimed to provide in-depth literary insight on OSH management implementation and policies deployment in the transport industry in Malaysia.

Occupational Safety and Health Management Global Standards

World Health Organization (WHO)

World Health Organization (WHO) is the world health directing and coordinating body within the United Nations system that is responsible not only for leadership on global health matters and world health research agenda, but sets the world health guidelines and standards, provides technical support, monitor and assess health trends, and working witlh all countries and governments on global health problems to improve people"s well-being (WHO, 2013).Years back in 1995, WHO defined occupational health aims at: the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations; the prevention among workers of departures from health caused by their employment; the protection of workers in their employment from risks resulting factors adverse to health; and the placing and maintenance of the workers in an occupational environment adopted to his physiological and psychological ability and the adaptation of work to man and ergonomics (WHO, 2000). Now, in the 21st century, health is now a shared responsibility through WHO REFORM (WHO, 2014).

International Labor Orgnization (ILO)

After a series of global safety and health conventions, the International Labor Organization (ILO) is now the world mandate body that governs safety and health of workers, works and the environment. ILO"s basic function is to formulate international labour standards, sets minimum standards of fundamental human rights at work and other standards regulating conditions across the entire spectrum of work-related issues (Report V1, ILO 2003). The driving force for ILO specifically regulates the main principles, means and methods dealing with OSH concerns as laid down in 17 Conventions, one Protocol and 23 Recommendations . Quoted in Report VI (ILO, 2003): "safety and health at work is an urgent concern in all regions of the world and there are indications that the levels of occupational accidents and diseases are on the increase. OSH matters have expanded from a workplace, sectoral and national focus to the global arena; OSH is firmly embedded in the concept of decent work and integrating with social, economic and environmental policies towards global sustainable development. The underlying principle is that workers should be protected from sickness, disease and injury arising from their employment. However, the reality in the world is two million people die every year from work-related accidents and diseases (ILO, 2014). Hence, regardless of the boundaries between ILO and WHO, the common underpinning aims are addressing the integration of OSH management towards reducing occupational deaths, injuries and illnesses at work and occupations across the industries.Henceforth, OSH is the key management aspect towards the establishment of decent working conditions, work environment, safety work cultures and human right (Report VI ILO 2003) .

OSH Global Standards

There are several world OSH standards that have been successfully implemented by advanced nations such as United Kingdom (UK) and Europe, United States of America (USA), Australia, New Zeland and Japan.The OHSAS 18001 (now officially BS OHSAS 18001: 2007 in 2013) is an improvised version of BS8800:1996 Guide to OSH management systems is an internationally-applied British Standards for the establishment of OSH management system in an organization. OHSAS 18001: 2007 is presently the most widely used and recognized standard for Occupational Health and Safety Management Systems (OHSAS 18001). For USA, OSH management is governed by the US Department of Labor and the Occupational Safety and Health Administration (OSHA) regulated under their Occupational Safety and Healt Act of 1970 with the objectives to assure safe and healthful working conditions for working men and women by setting and enforcing standards; and by providing training, outreach, education and assistance (USA Deparmtent of Labor, 2014). OSH in Australia is coordinated by Department of Employment: Office of the Federal Safety Commissioner with the

Commonwealth, States and Territories having responsibilities for regulating and enforcing work health and safety laws in their jurisdictions.However, Safe Work Australia was set up in 2009 as an independent Australian Government statutory agency which is jointly funded by the Commonwealth, state and territory governments with the primary responsibility to lead the national policies development on work health and safety and workers" compensation arrangements across Australia. Japan adopted the ILO OSH MS Guidelines on OSH management system (ILO-OSH 2001) into their own created JISHA OSHMS Standards 2006 (ILO-OSH 2001). Japan Industrial Safety and Health Association (JISHA) initiated the OSH management systems (OSHMS) to enhance workplace safety and health and to prevent industrial accidents. JISHA developed the JISHA OSHMS Standards 2006; thus becoming the first external certification body for OSHMS in Japan (JISHA, 2014). As for the world ISO standards, the International Organization of Standards (ISO) is presently working on the newly-proposed world standard for OSH management system which is the ISO45001: Occupational Health and Safety Management Systems–Requirements which is the ISO version of the OHSAS 18001 standards (ISO, 2013) which is expected to be published in October 2016.

Occupational Safety and Health Malaysian Standards

OSH management in Malaysia is governed by the Department of Occupational Safety and Health (DOSH) (DOSH, 2013) under the the Malaysian Occupational Safety and Health Act 1996 (Act514) supporting the Factory and Machineries Act, 1967. Apart from DOSH Malaysia being the enforcement body, other government agencies such as Social Security Organiation (SOCSO), Department of Fire Rescue Services, Local Town Councils, Ministry of Health and Minstry of Human Resources are entrusted with matters associated to saving of lives, public health among workers and society (Shariff, 2011). The Malaysian OSH laws enforcements were very much focused on the construction, mining and quarry industry for the past fifteen years (1997 – 2012) due to the rapid national development and increase of nationwide construction projects. Implemention and enforcement of OSH management and laws in the transport sector was very minimal then as there were not many numbers of vehicles (pubic and private) and the number of road fatalites/accidents were relative less as compared to those former industries.There was no emphasis from any parties, agencies and the national government on the enforcement of the OSH laws in the transport industry in Malaysia until the recent drastic increase on road fatalities and tragedies and commuting accidents with high numbers of deaths involving public and workers that occured in the last 7 years in 2007–2014. Additionally, workers in the logistics industry also suffer high rate of occupational accidents as reflected in considerable share of occupational fatalities, lost-time injuries and workers compensations (Au Yong and Mohamad Zailani, 2011; Ismail et al. 2010; SOCSO, 2009 – 2012; Lind and Nenonen, 2008).

Malaysian MS1722: 2007 OSH Management Standards

Malaysia has established its new OSH management standards, the MS 1722 : 2011–Occupational Safety and Health Management System–Requirements. This standard is an adaptation of the OHSAS 18001 that serves as the primary basis for the development OSH systems in Malaysian organisation using systematic approach to control and improve occupational, health and safety performances; to protect employees from work hazards, injuries, ill health, diseases, near misses and fatalities; and to comply with the Malaysian legal requirements and regulations: Occupational, Safety and Health Act 1996 (Act514), Factory and Machinery Act 1967 (Act139) and Petroleum (Safety Measures) Act 1984 (Act302).

Transport Industry Sector

The transport sector is one of the growing sectors in the European economy; it is highly affected by changes such as growing proportion, migrants, part-time workers, rapid ageing workforce and many technological innovations.Transport workers are exposed to multiple physical risks, suffer violence; and many of these transport workers have unusual long working times, repetitive and monotonous works. The consequences are high accident rates, musculoskeletal disorders, stress and fatigue (World Bank Report 2013, European Risk Observatory Report, 2009). The World Bank"s concern with transport safety is not new. Recent estimates in1999, estimated 800,000 people died as a direct result of road accidents. WHO reported even higher with 1.2 million people; quoted “about 85 percent of these deaths occurred in the developing and transitional economies; 50 percent were in urban areas. Additionally, an estimated 30 million people were injured in road accidents worldwide, of which 75 percent were in urban areas. For the developing countries, the economic cost of accidents is estimated 2 percent of their gross domestic product (GDP). Road accidents currently rank ninth as a cause of deaths worldwide, and are expected to rise to sixth by the year 2020; with drivers and passengers of motorcycles and three-wheel motor vehicles accounted for 10 percent. In some East Asian cities, such as Kuala Lumpur up to two-thirds of those injured were from road accidents. Public

transport passengers, drivers of trucks and buses have particularly bad accident records (World Bank Report, 2013; ILO 2013; European Risk Observatory Report, 2009). Malaysia recorded 23–28 fatalities per 100,000 population for the past ten years as compared to other nations with 4–5 fatalities per 100,000 (MIROS, 2013). In Malaysia, the increasing road accidents caused concerns from the public and relevant ministries. The huge economic loss due to road accidents is a waste and strategies needed to be embarked to reduce the number of accidents and fatalities (Karim, Marjan and Abdullah, 2003). Malaysian transportation companies did not have safety management systems; inadequate personnel trainings; machineries were not provided with appropriate tools and equipment for emergency response during mishaps; and employees lacked general awareness and basic knowledge on emergency response (Aini et al., 2001).

The transport and storage industry in Malaysia contributed 8.4% of GDP in Malaysia in 2008. From the laborforce survey in 2008, out of the 11.2 million employed persons, Transport, Storage and Communications sector employed 0.54 million persons (5.1%) of the work force (Au Yong and Mohamad Zailani, 2011); with manufacturing sector (1.96 million,17.6%); construction sector (1.0142 million, 9.1%). The workers in the road transport sector generally are generally lorry and van drivers, taxi drivers and chauffeurs, bus and coach drivers, motorbike delivery services and mostly employees who commute from home to work in their own cars or vehicles. The common public transport issues and challenges are dominantly: rails and LRT, buses, express buses, taxis, road safety issues, highway cracks, bus transportation organisational issues, enforcement issues from the transport authorities and non-sustainability of transport business stated by Sadullah (2012).Thus, Sadullah (2012) reiterated the needs for a sustainable transportation system in Malaysia that "allows the basic access needs of individuals to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations".

Occupational Safety and Health Management in Transport Industry

Managing occupational safety and health matters in the road transport sector can be challenging because drivers work alone, away from their base, and have to contend with traffic danger in addition to many other risks that are difficult for them to control (Karim, Marjan and Abdullah, 2003). But risk management measures can be successful if they take account of how the sector operates in practice, as well as the characteristics of drivers themselves and the way they work (Lee, 2011; Lee 2012; Lind and Nenonen, 2008).

One main characteristic of the transport sector is the mobility of workers and their workplace (ILO, 2003; 2014). Their workplace move with them to different surroundings (when travelling in a vehicle to different locations); or the workers themselves may be constantly moving and working at different locations (Au Yong and Mohamad Zailani, 2011). As a result, due to their working conditions, a high proportion of the risks may be unforeseeable. This needs to be taken into account when assessing and monitoring their situation. Some transport workers also work in customer service activities, where risks are multiple, but awareness of safety and health issues is low. Some of these tasks are considered as non-transport related, for example cleaning tasks on trains, ships and buses, and may therefore are left out from risk assessment and prevention" (Au Yong and Mohamad Zailani, 2011).
Working in the road transport sector requires high levels of professional skill and competence (ILO, 2014). For example, drivers of long-distance road haulage vehicles must not only be capable drivers but they must also be able to carry out basic administrative works, do load/unload operations, repair technical problems, possess language skills, act as „ambassadors" for their company in other countries and to deliver their goods in time, regardless of weather and road conditions.They may also transport dangerous substances or fragile goods that require extra care and responsibility (ILO, 2014; Report VI ILO 2003).

Generally, road accidents in transportation industry involve not just the driver alone but third parties as well, particularly public transport users, other road users and the public (MIROS, 2013; Lee, 2011). Investigations revealed significant weaknesses in the management of OSH system by transport operators. In 2007, Malaysia Institute of Road Safety initiated the Code of Practice for Safety, Health, and Environment (SHE) in the Transport Sector (MCP1/2007) for public transport (MIROS, 2013). This code of practice was an adaptation from the Malaysian MS1722: 2007 deploying the five main OSH management principles: Policy, Quality Assurance System, Planning and Implementation, Evaluation, Actions and Improvement. However, in 2010, Occupational Safety and Health Industry Code of Practice for Road Transport Activities 2010 (ICOP 2010) was launched replacing the Code of Practice for Safety, Health and Environment for the Transport Sector (MCP 1/2007). This new industry code of practice (ICOP) is interlinked with the Malaysian OSH Act 1994 and its regulations. Despite the two

different approaches (MCP1/2007 using MS 1722 and ICOP using legal enactment), both of these COPs shared common reference terms: roads encompassing public and private roads; vehicles encompass but not limited to: a) commercial; b) public service; c) goods; and d) tourism vehicles; bearing the same terminologies assigned under the Road Transport Act [Act 333]; Commercial Vehicles Licensing Board Act 1987 [Act 334]; and Tourism Vehicles Licensing Act 1999 [Act 594].

Summary of Findings

Based on the intensive literature review, a summary was done to hilight the presence of OSH and tranportation hazards as shown in Table 1: Identification of Hazards in Transport Industry.

Hazards in Transport Industry (MIROS, 2013)	**Hazards in Transportation (ILO 2003; 2013; WHO 2003; WHO 2014)**	**Hazards in Transportation from past research and publcations**
Driver falling asleep while driving due to exhaustion and fatigue Driving while drowsily and exhaustion Dangerous driving Not wearing seat belt Loss of control of vehicle due to brake failure Slipped of vehicle due to slippery road Emergency exit door not functioning Worker slipped on automotive workshop floor because of slippery floor surface caused by spilt oil or grease Noise resulting from repair of vehicle Fire caused by inflammable gas related activity such as welding; Struck by falling goods while loading and unloading from vehicle	Drivers fatigue Incapable drivers Lack of drivers competencies Low level of professional skills Work related stress Psychosociasl risks - Human suffereings - Mental problems - Burn out - Economic losses - Discomfort Bad road conditions Weather conditions Working conditions Poor medical facilities Occupational diseases Ill-health Illnesses and diseases	**Ashraf and Naseem (2003):** Improper work place design Ill-structured jobs Mismatch abilities with job demands Adverse working environment, Poor human-machine system design Lack of management programs **Goetsch (2007; 2011):** Slips and falls; Impacts and collisions Falling objects; Fall from heights Electrical hazards **Goetsch (2007; 2011; 2014):** Chemical hazards; Physical hazards Biological hazards; Psychosocial hazards; Ergonomics Electrical and Mechanical hazards **Au Yong and Mohamad Zailani (2011):** Mobility hazards Long distance driving hazards Indirect transport hazards **MIROS (2009 – 2012):** Lack awareness Human hazards; Road hazards **Lee, 2012; NIOSH, 2013; DOSH, 2013:** Commuting accidents; Road accidents Hazards in transport activities

Table 1: Identification of Hazards in Transport Industry

Subsequently, Table 2 shows the OHSAS1800 and MS1722 standards on OSH management; and the MCP 1/2007 and ICOP Road Transport Activities 2010.

Occupational health & safety management systems –Requirements OHSAS 18001: 2007	Malaysian Standard Occupational Safety & Health Management System–Requirements. MS1722: 2011	Code of Practice for Safety, Health, and Environment (SHE) in the Transport Sector MCP 1/2007	Occupational Safety and Health Industry Code of Practice for Road Transport Activities 2010 ICOP 2010	
4.1 General Requirement **4.2 OH&S policy** **4.3 Planning** 4.3.1 Hazard identification, risk assessment & controls 4.3.2 Legal & other requirements 4.3.3 Objectives and programme(s) **4.4 Implementation & operation** 4.4.1 Resources, roles, responsibility,	**4 OSHMS Requirement** **4.1 Policy** 4.1.1 OSH policy 4.1.2 Employee participation **4.2 Organizing** 4.2.1 Responsibility & accountability 4.2.2 Competence & Training 4.2.3 OSHMS documentation 4.2.4 Communication **4.3 Planning & implementation**	**1 Introduction** **1.1 Introduction** 1.2 Objectives 1.3 Scope 1.4 OSH Act 1994 **2 Implementation & concepts** 2.1 Introduction 2.2 Policy 2.3 Quality asurrance & safety 2.4 Planning & implementation 2.5 Evaluation 2.6 Action & Improvement	**1 General** **1.1 Preliminary** 1.2 Scope 1.3 Objectives 1.4 Interpretations 1.5 Legal Requirements **2 OSH programs** 2.1 Safety & health policy 2.2 SHC 2.3 SHO 2.5 HIRAC 2.6 Dissemination information 2.7 Documentation	4.3 Safety Maintenance Improvement & plan 4.4 Safety inspection, manitenance & repair faciltities 4.5 Maintenance records 4.6 Traning & education for maintenance & safety inspections

accountability & authority 4.4.2 Competence, training & awareness 4.4.3 Communication, participation & consultation 4.4.4 Documentation 4.4.5 Control of documents 4.4.6 Operational control 4.4.7 Emergency preparedness & response **4.5 Checking** 4.5.1 Performance measurement & monitoring 4.5.2 Evaluation of compliance 4.5.3 Incident investigation, nonconformity, corrective action& preventive action 4.5.4 Control of records 4.5.5 Internal audit **4.6 Management review**	4.3.1 Initial review 4.3.2 System planning, development & implementaton 4.3.3 OSH Objectives 4.3.4 Hazard prevention 4.3.5 Management of Change **4.4 Evaluation** 4.4.1 Performance monitoring and measurement 4.4.2 Investigation of work-related injuries, disabilites, ill-health disease & near misses & impacts on OSH performance 4.4.3 Audit 4.4.4 Management review **4.5 Actions for improvement** 4.5.1 Preventive & corrective actions 4.5.2 Continual improvement	**3 Standard Operating Procedures (SOP)** 3.1 Introduction 3.2 Drivers management 3.3 Vehicles management 3.4 Journey Management & Risk 3.5 Document management system	& record keeping 2.8 ERP 2.9 Monitoring 2.10 Auditing 2.11 Continual Improvement **3 Driver Management** 3.1 Driver intake procedure 3.2 Drivers categorization 3.3 Training and change of thoughts behaviors 3.4 Driving procedure 3.5 Driving hours and working hours limit 3.6 Drivers rotation 3.7 Drivers monitoring 3.8 Driver health & welfare **4 Vehicle management** 4.1 Daily checks 4.2 Vehicle fault recording & reporting	4.7 Vehcile licnse 4.8 Vehicle Cleanliness **5 Journey & risk management** 5.1 HIRAC 5.2 Identification of hazards & routes risks 5.3 Trip schedule 5.4 Rest & Recreation 5.5 Trip monitoring 5.6 Passengers goods & baggage management **5.7 ERP** **5.8 Reports & accident investigation** **5.9 Complaints management**

Table 2: Comparison of OSH management requirements and Codes of Practices in Transport Industry

Conclusion

Occupational safety and health (OSH) matters in the transport industry are perceived as solely the government responsibility; and that OSH is governed by national laws and codes of practices.Not much concerted efforts and trainings are given to the public on OSH laws and programs; and more so for the employees and workers on the proper ways of carrying out jobs in their productive employment.Transport industry is an equally hazardous industry just like the chemical and construction industry; and it is more critical when it involves public and passenger safety. Despite the increasing numbers of fatalities and injuries, not much progress and effective controls are being executed towards risks mitigations and accident prevention in the transport industry.The OSH codes of practices, standards, and the extent of OSH implementation is far from the expected goals itself. Adherence and enforcement are also lacking in the real transport industry in Malaysia. In conclusion, there is an urgent need to enforce OSH legal requirements and codes of practices on OSH management, trainings, monitorings, and effective implementation in accordance with the ILO Decent Work Agenda. OSH is complex; it requires collective attention to a broad aspect of human, budgetary and technical variables as reported by ILO (2014), MIROS (2013), and all researchers in their studies.

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STREET TURN STRATEGY: AS A GREEN LOGISTICS TOOL IN MALAYSIA

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Introduction
In recent years, the logistics industry in Malaysia has expanded very quickly in response to the pressures of globalisation. As one of the biggest industries in Malaysia, the logistics and transportation sector has the sheer size of being large enough to have a significant impact on the environment. As such, reducing harm to nature can be done by implementing a logistics and transportation strategy that is friendlier to the environment. This is a point established in a study conducted by Rodrigue, J.P., (2011), the logistics and transport industry is a major contributor to environmental issues through its various modes and infrastructures. As a developing industry, logistics and transport was seen as a golden opportunity for the adoption of more environmentally friendly practices and present a more environmentally friendly face to the world at large.

At the forefront of this development in the logistics industry is the humble container. However, transporting a container is not an environmentally friendly process. For example, in Europe prime-movers contribute up to 10 percent (10%) of the carbon dioxide emissions (CESER, 2009). As similar vehicles are used here in Malaysia for the transportation of containers, emission figures should not be largely dissimilar. Hence, “green” practices such as minimizing the movement of empty containers should be practiced in Malaysia. The industry practice of container movement in Europe largely uses two strategys which called „Depot Direct" and „Street Turn", these strategys are looked upon as suitable tools for the management of containers that is hauled by the prime-movers. However in Malaysia, logistics practitioners still have not implemented similar strategys that will be the foundation of green logistics thus helping in reducing carbon emissions in Malaysia. If Malaysia truly desires to implement similar strategys like those found in European there is no need to implement a change in the logistics network structure-that may be costly. A mere change in management can generate efficiency and effectiveness gains over a longer period of time, (Association of Malaysia Haulier, 2011). Therefore, this study is a suggestion to the government and the logistic industry to clarify which is the best strategy for implementation in order to manage the movement of empty containers based on the cost measurement indicator.

Problem Statement
Normal operations involving the movement of empty containers, is usually identified with inefficiency, as there is a failure to maximise utilisation of both fuel and the vehicle. A study by Dam Hanh, P.I.L (2003), had found that for inbound and outbound cargo, loaded containers are picked up by haulier companies from the carrier"s terminal and are delivered to the consignee for unloading. The containers are then returned to the carrier"s terminal, usually by the same haulier company. The same practices are in place for outbound cargo. Haulier companies pick up empty containers required by an exporter from a carrier"s terminal and deliver these empty containers to the exporter for loading. After a container has been loaded, a haulier company will transport the loaded container to the carrier"s terminal where it will be stacked at the pier prior to loading on to a container ship. It is clear that, in the case of both export and import cargo, at least two thirds of the require container haulage trips involve empty container movements, either for empty pickup or empty return.

McKinnon, A. and Edwards, J., (2010), said that empty journeys are not only wasteful economically, but also carry an environmental problem. They also said that, nowadays this situation is not similar because over the last 30 years the proportion of empty running by haulage in the UK has steadily declined, yielding significant economic and environmental benefits. As a conclusion, in order to solve this empty container problem, most of marine terminal companies have come out with several strategys which have been put into practices. The main thrust of these management practices is not only to reduce the problem of empty containers but also to support principles of green logistics in managing global warming issues.

One of the most popular strategys that are implemented in the United Kingdom (UK) and marine terminals in the United States of America (USA) is a combination of the “Street Turn” strategy and “Depot Direct” strategy.

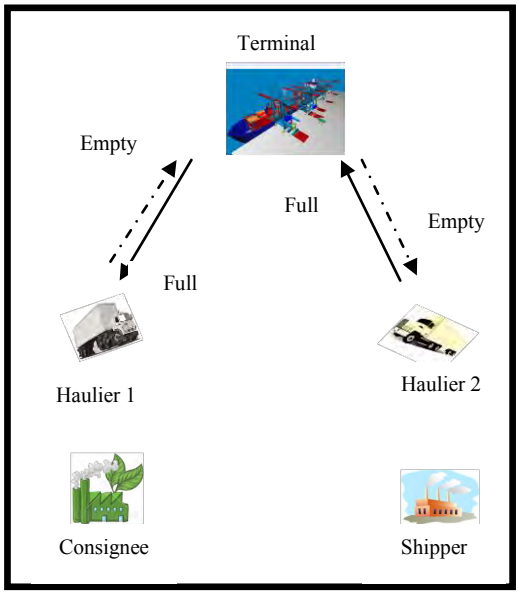

Figure 1: Depot Direct

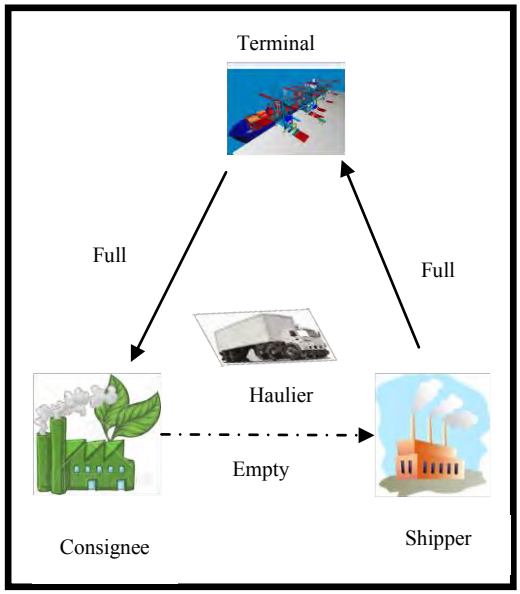

Figure 2: Street Turn

A study by Jula,H., et al., (2008), defined depot direct strategy as a normal operation of container haulage for import and export goods from terminal, port or depot to their consumer and this strategy is suitable for the short distance travel. The „Street turn strategy" defined as movement full load container haulage from the beginning and until the ending of operation and the rules for this strategy is consists of using empty import container for export loads without first returning them to marine terminals. According to International Asset Strategys (IAS), 2006, this “Street Turn” strategy can be more effective by running together with information system that automatically updates the information about the availability and location of empty containers. Based on the street turn strategy, researchers have found that by implementing the idea of reusing empty containers, substantial reduction in related haulage trips from and to the container ports, reduction in costs can be obtained. Moreover, as a result of the study conducted by Jula, H., et al., (2008) showed that by allowing substitution between different types of empty containers, we can further decrease the number of the haulage trips and also cost related to empty containers. In other that, by implementing the idea of reusing empty containers the traffic congestion around the container terminals can be improve and as a consequence emission can also be reduce significantly.

In Malaysia, the depot direct strategy is normally used by industry players and from the general observation this strategy is not environmental friendly strategy if we want to support the principles of green logistics, as it truly shows wastage in terms of cost and carbon emissions (Association of Malaysia Haulier, 2010). However, if there is implementation of a new straegy like „street turn" in Malaysia for container haulage operation, the question which arises is how effective this strategy in reducing cost operation in the haulier company? The effectiveness of this street turn strategy has been measured by looking at the cost operation (to measure the commercial impact) and also the perception toward this strategy implementation.

Literature Review

Normally, the “Depot Direct” strategy will be used by a haulier company when operating a prime mover for the carriage of a container from depot, port or terminal to a customer"s designated place of delivery. Detailed explanation of this strategy was given by Dam Hanh, P.I.L (2003), in his study. He has said that the potential benefits of depot-direct are establishing a neutral supply point for reusable empties,

facilitating empties drop-off and pickup when terminal gates are congested or closed and adding buffer capacity to the marine terminals. The concept of off-dock empty depot may be more attractive and promising in the long term than the short term. However, in the long term, congested marine terminals and the high capital cost of expanding on-dock containers would justify the higher operating cost of empty depots. When compared to “Street Turn” strategy, a new scenario for distribution can be observed. The rules of the „street turn" strategy are that, prime mover come back to terminal without empty carrying. The potential advantages of street turn including decreasing the operation cost.

Referring to a paper written by Chassiakos, A., (2008), one can see that a change in logistics network structure may be costly to implement but, on the other hand, generate effectiveness gains if seen over a longer period of time. The advantage of „street turn" is that the physical network structures remain largely unchanged, whilst its implementation will see almost immediate commercial benefits. It is one of the low hanging fruits that remain ripe for picking in green logistics. Chassiakos" study shows that a successfully implementation in Europe can make the „street turn" strategy as a green initiative which may quite easily be implemented into the organization and instantly reduce emissions as well as costs. Next, we refer to study conducted by Wang, R., (2008). In his study, he had developed a strategyatical description to the process of empty containers allocation, clarifing the subjective and objective reasons which causes the empty container allocation, the characteristic of empty container allocation and the question which exists in the practice and actual operation of container trasportation, as well as analysis of the major factors affecting empty containers allocation. He also established a liner programming model which not only deal with the characteristics of empty container allocation, but also very easily applicable to shipping practice. From this study it was shown that, there were several countermeasures to decrease the cost generated by empty container not being managed effectively.

A smilar study to that carried out by Wang, R. was proposed by Deidda, L., et al., (2008), where a new decision tool based on a mathematical programming approach was used. In this paper the proposal was for the use of a decision support tool to quickly determine truck routes and implement the street turn strategy. This tool is based on an optimisation model determining the allocation of empty containers between customers and defining truck routes in a post-optimisation phase. They compared routes resulting from the proposed model to the decisions of a real shipping company. Early results indicate that this approach represents a promising support for shipping companies in dealing with street turn. It can significantly reduce distances travelled by trucks and times requested to determine routes.

In addition, a clear benefit in term of cost and reducing carbon emissions a study by Hossein Jula, H., (2008: p. 211) also found that a small percentage in decreasing empty container traffic, meant that there was also a reduction in relocation traffic and this can be reflected in huge congestion reduction as well as improved operational cost. Hossein"s study encompassed the reusing of empty container and its role in the process of facilitating the interchange of empty containers at ports. In particular, the depot-direct and street turn methodologies are investigated, and variants of the empty container reuse problem are considered. His study focusses on traffic congestion and long queues at the gates of the terminals which are becoming the major source of driver inefficiency, wasted energy and increasing maintenance cost imposed by the volume of trucks on the roadway. Therefore, similar factor from this study will be use as a guide for conducting this study in Malaysia but there will several modifications to take into account the different environment and policy in Malaysia.

Theoretical Framework

Measurement of the effectiveness of using the „street turn strategy" in road haulage companies will be performed by focusing on cost effectiveness factor. The identification of these factors have been made in previous international studies and show that these are major factor contributing to its effectiveness as tool for green logistics.

The important of cost to measure the effectiveness of Street turn strategy have been prove in studies conducted by both Dam Hanh, P.I.L (2003) and Wang, R. et al., (2008). Both conclude that, the cost control and reduction in managing empty containers have become the key aspects which influence a road haulage company"s operation state. Under cost effectiveness dimension, there will be four (4) elements to support the measurement of the effectiveness of the Street turn strategy. These elements consist of

vehicle impact, fuel utilization, waiting time as well as toll and road traffic. This selection is made by referring to study conducted by Nash, C. et al.(2003), where the authors found that the marginal cost of freight transport by heavy goods vehicle (HGVs) depend on several factors: which varies with traffic volume, road damages, uncover accident and fuel. Therefore by managing these elements with a suitable strategy, there could be sizeable cost savings.

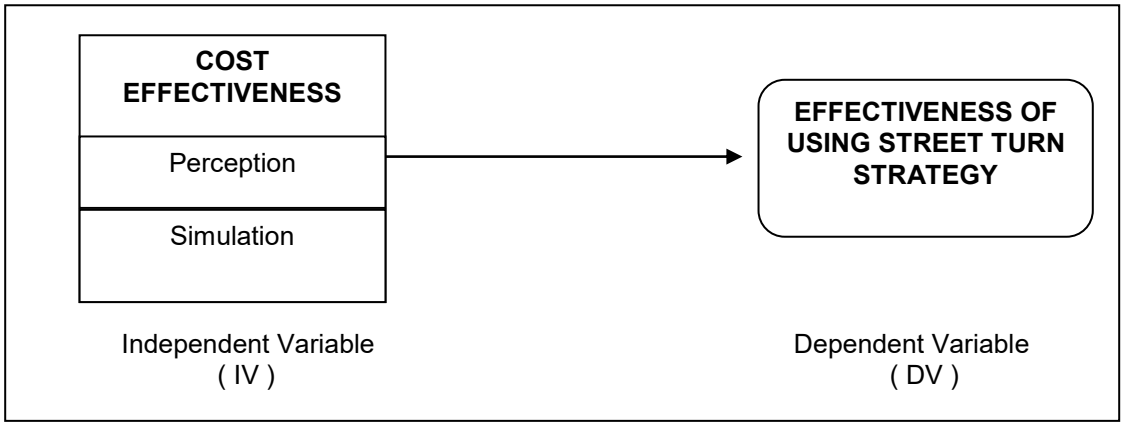

Figure 3: Theoretical Framework

Dimension	Element	Author & Year
Cost	• Vehicle Impact • Fuel Utilization • Waiting Time • Toll & Road Traffic Selection	▪ Larsson,F.E. & Bernal,D.V., (2010). ▪ Nash C. et al., (2007). ▪ International Transport Forum (2009)-Publish report. ▪ McKinnon, A., et al., (2010). ▪ Rodrigue, J.P. et al., (2001). ▪ Pandian et al., (2008). ▪ Uehara et al., (2000) cited in Pandian et al., (2008). ▪ Balke et al., (2005) cited in Pandian et al., (2008).

Table 1: Dimension & Element

Methodology

Sampling procedures

The target population would be 344 companies that carry on the business of road haulage in Malaysia as listed in the Malaysia Logistic Directory 2010/2011. The respective respondents in this study will be the manager and middle management in operation department because they are well known about the strategy in their company. All these companies will be separated into three categories which is “Small, Medium and Large” company as followed by several criteria (the annual sales turnover or full-time employees) that are approved by Companies Commission of Malaysia (CCM) for more details see table 2.

Types	Employement			Sales Turnover		
	Number of Employees	Number of SMEs	(per cent) %	Category of Sales Turnover (RM)	Number of SMEs	(per cent) %
Micro	<5	694	17.8	<199,999	773	19.7
Small	5 – 9	1,935	49.5	200,000 to 1 million	1,429	36.5
Medium	20 – 50	834	21.4	1 million to 5 million	1,271	32.5
Large	>50	445	11.3	> 5 million	445	11.3
Total		3,908	100		3,908	100

Table 2: Profile of SMEs in the Transport and Communication Service Sector

Therefore, the sample for this study consists of 162 companies that are involved with the haulage of containers in Shah Alam and Klang, Selangor. The reason for choosing this area, is because SMEs in Selangor are predominantly in the transport equipment and electrical sector (Saleh, A.L. & Ndubisi, N.O., 2006),and researcher had sorted from many sources (analysis from Malaysia Logistic Directory, 2010/2011). Regarding to the population, researcher will select a sample by using the simple random sampling method, Sekaran (2003) considers this the most efficient sampling design when differentiated information is needed from the various strata within the population; purpose of using this technique is to avoid members of population being significantly under or over represented (Hussey and Hussey, 1997). The optimum sample size is 85 to 92 determined based on the sampling table provided by Bartlett, Kotrlik and Higgins (2010).

Data collection and analysis procedures

A set of structured questionnaires is used for primary data collection as a survey instrument to serve as the basis for collecting data pertaining to cost effectiveness when using Street Turn strategy as a green logistic tool. This method is to enhance empirical evidence in find out the users" views and experiences in using the strategy. This questionnaire has been distribute to the road haulage company. Through the questionnaires, feedback on cost effectiveness was collected. To ensure standardization and ease of analysis, all constructs was measured on a 7-point Likert scales ranging from Very Strongly Disagree to Very Strongly Agree to examine how strongly subjects agree or disagree with statements. Researcher also use selective based questions only require respondents to tick in the appropriate box or boxes. Nevertheless, some modifications may be necessary to suit the specific context of the current study.

Quantitative

Quantitative study is more appropriate for this research because the main research problem of this thesis involves a lot of information from road Haulage Company that cannot be qualified such as measurement of their cost operation. Besides that, researcher had used estimation calculation to measure cost of fuel for one container haulage trips per day to compare with the profit gathering from the similar haulage on that day to identify fuel utilization result. Formula that has been used would be:

Estimation of Fuel Calculation:

$$\frac{\text{Distance Travel (km)}}{\text{2km}} \times \text{Fuel Price (RM)} = \text{Fuel Cost}$$

Figure 5: Fuel Cost Formula

Based on 2012 price
1 Liter Diesel = RM 1.75 (actual price)
1 Liter Diesel = RM 1.48 (subsidy price)
1 Liter Diesel = 2 km

Example calculation:
Distance travel (km) = 15km
Fuel price (RM) = RM 1.48/L

$$\frac{15\text{km}}{2\text{km}} \times \text{RM } 1.48 = \text{RM } 11.1 \text{ (fuel cost)}$$

Data analysis
The respondents perception has been analysis by using the Statistical Package for Social Science (SPSS) software. The researcher has used, correlation coefficient and linear regression as a statistical technique to measure the data gathered. To determine the association between variables, researcher had run correlation coefficient to determine strongly positive or negative significant relationship between each variable and finally, the researcher had used regression linear to determine how strongly the variable will influence the dependent variable. Based on result gathered in final stage analysis, the researcher can make an attempt to answer the research question and give a straight answer as to whether the objectives of this study have been met.

Conclusion
The findings indicate that the majority of road haulage companies in Malaysia perceive that the „Street Turn" strategy can reduce operating costs based on the number of trips empty movement is lower compared to the „Depot Direct" strategy. This also supported by the result of calculation gathered showed that the percentage of cost reduction is quite high for the „Street Turn" strategy implementation. This reduction is based on the total fuel that had been well utilise by the road haulage operator and the road selection that had been made to avoid tolls and crowded area. As a conclusion from this calculation, it was proved that by implementing the „Street Turn" strategy, the road haulage company will experience the cost saving based on the total amount of cost reduction is quite high when compared to the implementation of the „Depot Direct" strategy. From this result also, it was truly show that the perception of a road haulage company towards cost can be reduced by implement the „Street Turn" strategy is fully supported by this calculation result. Apart from this result, the level of acceptance and awareness the road haulage companies in Malaysia towards green logistics has been identified. On the other hand, this result cannot be compared with the previous study result because there is no perception analysis that had been done according to a review of literature.

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Profiling the Malaysian Logistics Industry

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Abstract
For any industry, the need of well established profile is necessary in order to stay ahead in the competition. The logistics industry is an example of the birth and development of a vital new service-based industry.This industry has been transformed from a support business for the others industry into the logistics services provider which serving the entire logistical needs. The need of a logistics industry profile is very important in order to know the industry structure. In order to gain a good structure for the Malaysian logistics industry, it is essential to do a profiling to the industry. However, the profiling activities or process in logistics industry is very limited. Other than that, it is important to know the definition, dimensions and the importance of profiling before it is used to analyze the logistics industry in Malaysia. This paper presents comprehensive information about the definition of profiling, dimensions covered in the profiling process and the understanding of how importance profiling in logistics industry.

Introduction
Logistics is a major element which supports the economic growth in the world. Logistics is a part of the supply chain process that plans, implements, and controls the of efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption in order to meet consumers' requirements (Souza & Goh, 2007). Logistics holds a major function in the import export and plays a significance role in the international trade growth. Logistics not only consists of the physical movement of goods but it has to be efficient in facilitating the movement of documents processing, coordination, monitoring and financing activities (Zuraimi & Dahlan, 2012).

Logistics industry also include the process which require for the conveyance, storage and additionally handling of production raw material and culminated goods from producer to end consumer. Due to the trend of nationalization and globalization in recent decades, the conventionality of logistics management has been growing in retail trade (Tseng, 2005). The main consumers for logistics industry normally comes from different industries such as automotive, agriculture, manufacturing, food and beverage, electronics and others which use logistics as a medium for them to sell their finish goods and at the same time to get the raw material for their products. Therefore, the efficient and more preponderant supply of logistics can avail to simplify international trade. Apart from inspiriting local trade, the economic magnification withal much more depend on the international trade which is at this stage the utilization of logistics industry seems very consequential in order to gratify both party, end users and supplier.

The rapid growth of the logistics industry in Malaysia increases significantly and has become one of the main contributors to the national Gross Domestic Products (GDP). Thus, it is essential for the logistics industry to have standard established data which can show a structure or profile of the industry.

Literature Review
The logistics industry is important for efficient international trade and also important for the economic development of a country. Logistics industry in Malaysia is supported by four mode of transport which are maritime, road freight, aviation and rail freight. The strategic location of Malaysia which is in the one of largest industrial regions lead to the rapid growth of the logistics industy. Malaysian ports have been located at one of the busiest shipping routes which is Port Klang and the Port of Tanjung Pelepas become an important transshipment hub for Asia (MITI,2014). The Kuala Lumpur International Airport (KLIA) and Senai Airport are key cargo airports.Both airports are expected to be expanded and become a regional air cargo hubs over the coming years.

In addition, the economic growth in Malaysia is supported by further development of the five economic growth corridor which are Iskandar Malaysia in Southern Johor (IRDA), Northern corridor Economic Region (NCER), East Coast Economic Region (ECER), Sabah Development Corridor (SDC) and Sarawak

Corridor of Renewable Energy (SCORE) (MIDA,2014).The availability of trade related infrastructure such as roads, aiports, railways and ports play an important role in a country's logistics industry performance. The support services such as third party logistics and fourth party logistics in the industry help the economic growth by providing a smooth and quality services to the local and global trade. Figure 1 shows the Malaysian logistics industry framework.

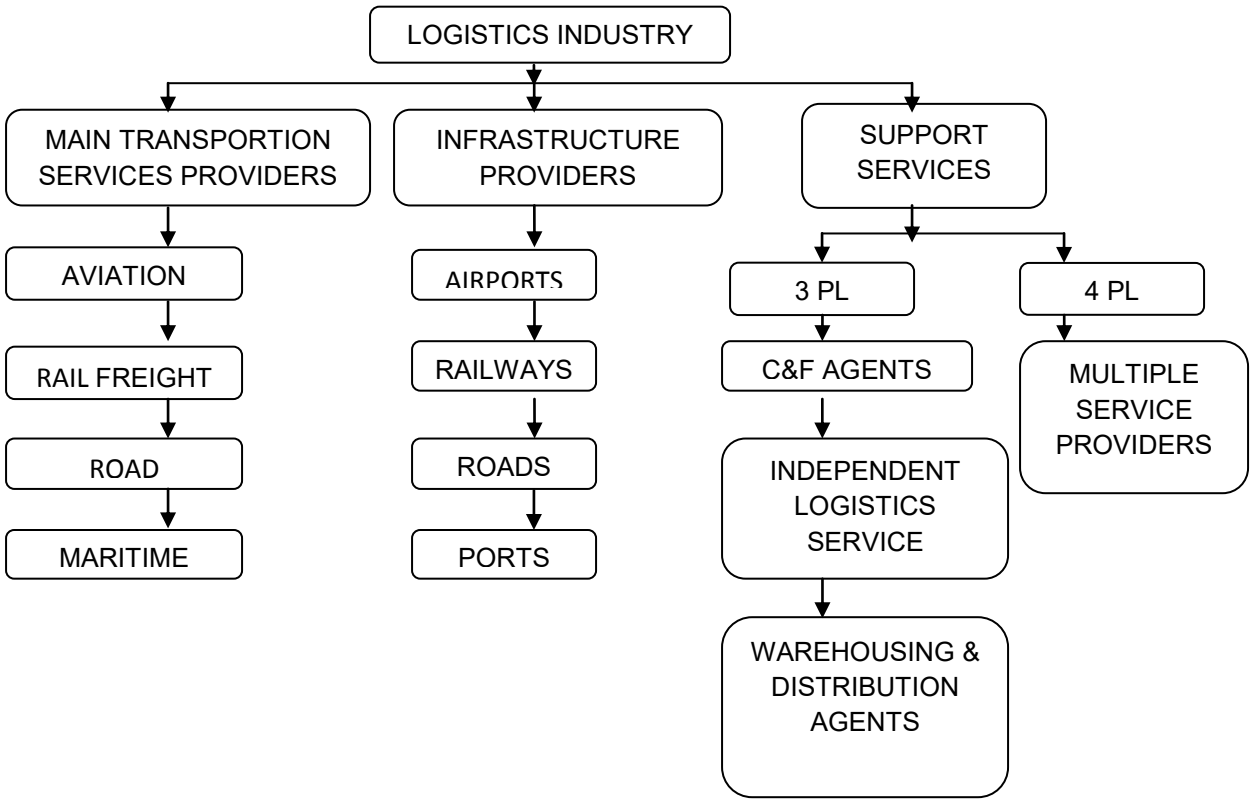

Figure 1 : Malaysian Logistics Industry
Sources: Adapted from Srinivas, K., & Krishna, K. (2009). Technological Innovations in the Indian Logistics Industry : The Case of Freight Handling, *VII*(Imi), 114–125.

In Malaysia, there is no single established data about Malaysian logistics related company (Ali, Jaafar, & Mohamad, 2008). The current data is from various database and directories which contains very limited information and some of the sources is not really informative. Each current database or directory have different number of logistics companies. This inconsistencies depicts the difficulties in estimating the exact number of logistics companies in Malaysia. This situation lead to difficulties in identifying and classifying the issues arise in the logistics industry. By having a record of this information, it is very useful to various agencies to identify and analyse the current strength and weaknesses of the industry, so that a better action plan can be taken and implement by the respectives agencies to rectify such weaknesses.

According to the Malaysian Productivity Report 2012-2013 (MPC,2014), there are about 42,115 establishments of logistics services companies in 2012. The huge numbers of companies and the liberalisation in this services sector attracted the foreign company to invest in Malaysia through the transparency in the logistics industry policies. However, this information or data is doubtful because it is contradict with the other sources of data. For example, in Registrar of Companies (ROC) there is only 3188 registered company, for Malaysian Logistics Directory the numbers of companies is only 776, Super Pages recorded 1693 companies while Land Public Transport Commissions (SPAD) only 34 companies. This inconsistencies lead to the research of profiling Malaysian logistics industry and this paper trying to describe and identify the meaning and dimensions of the profiling process together with the analysis of the

importance of profiling in logistics industry. Table 1 shows the analysis of Malaysian logistics databases and directories.

DATABASE	WEBSITE	TOTAL REGISTERED COMPANY
Registrar of Company (ROC)	www.ssm.com.my	3188
Malaysian Logistics Directory	www.msialogistics.com	776
Super Pages	www.superpages.com	1693
Land Public Transport Commissions (SPAD)	www.spad.gov.my	34

Table 1. Malaysian Logistics Databases

Research Methodology

In understanding the profiling terms, it is useful to understand the terms from various field of knowledge. From the previous literature on profiling in various field can provide an insight of information for this terms in various perpectives.In this study, the term profiling has been used as a keyword for the purpose to identify the definition of profiling, dimensions covered and also the importance of profiling in the logistics industry. The literatures mainly obtained from MARA University of Technology (UiTM) subscribed databases especially Science Direct, Emerald, ABI/INFORM, EBSCO Host and SpringerLink and websites. This databases and websites contain list of journals related to research topic such as Journal of Business Logistics, Transportation Journal, International Journal of Retail & Distribution Management, International Journal of Physical Distribution & Logistics Management and many more.

The searches was restricted to the keyword profiling only in order to analyze and get in depth information on this term. The time period covered was 1990 until 2014 and the the abstracts of all issues of the journal from this period was systematically searched. The search was restricted to the past 20 years because it seemed clear, on the basis of existing information, that earlier literature already been discovered through other procedures (Tähtinen, 2002). For the first phase of the searches, the term profiling was the keyword to search in all field such as in the Journal of Consumer Affairs, Third World Law Journal and Management of Environmental Quality: An International Journal. Then a selected article and journal was analyzed to gather the information. The purpose is to investigate the definition, dimensions and importance of profiling from various field of knowledge.For the second phase of the searches, the focus is to identify previous literature about profiling process from a specific journal or databases. At this stage, the study focus in any journal that are related to the logistics and transportation only.

Results and Analysis

Based on the first and second stage searched, the definition, dimensions and the importance of profiling from logistics and transportation perspectives together with from others field of knowledge are highlighted. The results for both phase of the research were combined together in this study in order to show the similarities and differences from various perspectives.

Profiling from different field of knowledge

Definition

The definition of profiling is different depends on the field of knowledge. Profiling was defined as the approach used to identify the consumers characteristics and the study of an individual behaviour (Durvasula, Lysonski, & Andrews, 1993). This definition was analysed from the Journal of Consumers Affairs. On the other hand, profiling in the International Journal of Production Economics is known as the process of examines the characteristics of people and categorizes them into a specific group (Johansson & Olhager, 2004). From the information sciences field, the profiling definition is the process of examining the characteristics of people and categorize them into a specific group (Huntington, Nicholas, & Williams, 2003). While from legal perspectives, the profiling known as the practices of ascribing certain behaviour (positive or negative) to a certain personal characteristics (Petrocelli, 2006). In the economic and social review, profiling was defined as a method of assessment which is generated by a formal statistical model that uses a range of characteristics of the individual concerned (e.g. age, education level, unemployment history, etc.) (J.O'Connell, Seamus, & Elish, 2012). Even though this definition is from different

perspectives, the profiling definitions focus on individual or groups of human and non human characteristics. The definition of profiling in Malaysian logistics industry was discussed in section 4.2.1.

Dimensions
The profiling activities covered by a certain dimensions which will reflect the outcome (profile/structure) of the sample. The dimensions or variables play a critical role in constructing the profile of specific elements. For example, a demographic cahracteristics of peoples user type, user characteristics and site preferences has been used by Huntington et al., (2003) in profiling the health web users. Other study showed that, the nature of services offering and the characteristics of process choice (Johansson & Olhager, 2004) are the variables used to profile the industrial services and in matching service offering and process. Other than that, racial profiling used a race, national origin,religion, etchnicity and behavior of an individual as variables to create a profile of a suspect. It is important to classify any crime based on the profile of suspects. Hill, Marino, & Chae (2003) in their study the Global Industry Profiling : machine tool industry, used global industry overviews, global consumption analysis and global production analysis as the dimensions for profiling where their main concern is the element of leading firm, major player, location product expertise, market sizes, market demand, major producers and sales of major products. The dimensions or variables used for profiling activities are different based on the research purpose. However, the basic dimensions used in profiling any sample is the demographic characteristics of the sample. Besides that, most of studies in profiling will gather other related information of the sample such as site preferences (Huntington et al., 2003) for the study of internet health seekers and consumer style characteristics (Durvasula et al., 1993) in order to get other information in profiling consumer's decision making styles. The dimensions of profiling in logistics industry is discussed in section 4.2.2.

The importance of profiling
There are several purpose in doing profiling to a certain subject of area. The purpose to conduct a research based on profiling activities give a signifance result which can lead to achieve a reserch objectives. It is important to conduct a profiling research, which at the end will produce a profile or structure for certain elements of the study. The importance of profiling is to understand human behavior, to segmenting human into various niches and to do a comparison between two or more country (Durvasula et al., 1993). The other study stated that profiling is important to identify and profile meaningful group of users by using a variety criteria, help website managers to target their services more effectively and knowing more about user profiles can lead to more site's information provision, presentation and also site classification (Huntington et al., 2003). Johansson & Olhager (2004) stated that profile can reveal possible mismatches in existing operation and also can be used to identify areas in need of corrective actions. In legal perspective, profiling is importance in identifying the profile of the criminals and this will lead them to the specific characteristics of suspect (Petrocelli, 2006). Besides that, profiling is important because it helps the researcher assess the factors influencing an individual's decision, provides the policy makers with a framework that will enable them to estimate what will be happen in advance so that they can create an action plan in facing any problem that could arise in future. The importance of profiling are discussed in section 4.2.3.

Profiling from logistics, supply chain and transportation perspectives.
The definition for profiling in logistics industry is not clearly mention in previous literature. However, each study showed the criteria needs in order to create a profile of logistics industry. From there, the definition of profiling can be translate into a meaningful definition, which can be use as starting point in developing a profile of logistics industry in Malaysia. Table 2 shows the number of profiling research conducted in logistics industry based on UiTM's subscribed database and website.

Journal/Publication	Number of Articles
International Journal of Physical Distribution & Logistics Management	3
Transportation Journal	2
Logistics and Transportation Review	2
American Journal of Business	1
The Eight international Conference of Chinese Logistics and Transportation Professionals	1
International Journal of Purchasing and Materials Management	1
Journal of Business Logistics	1
Journal of Small Business and Enterprise Development	1
Journal of Technology Management in China	1
TOTAL	**14**

Table 2. The journal in which profiling in logistics industry that have been published, 1990-2014.

A total of 14 article was found and have been analyzed in order to get the definition, dimensions and the importance of profiling in logistics industry. Table 2 shows that, there is still lack of research on profiling in logistics industry from year 1990 to 2014. Most studies were published in International Journal of Physical Distribution & Logistics Mangement folowed by Transportation Journal and Logistics and Transportation Review.

Definition

The definition of profiling in logistics industry was not mentioned directly and clearly in previous literature even though the studies about profiling of logistics industry. The researchers, normally focused on the dimensions and the importance of profiling activities. Only a few studies had mentioned or characterized the definition of profiling in their articles. For example, profiling is the process of study the corporate demographics characteristics such as firm size, firm age, logistics diversification, sources of revenue and peak demand period 3 . Aihu & Hong, (2008) describe the profiling as a data collection of firms characteristics like number of years in business, the services provided, the annual revenue and the number of employees. Johnson, Clure, Kenneth, & Wood (2004) indirectly stated that profiling is the classification of company and the study of operating characteristics which lead to the understanding of short line railroads. The term profiling in logistics industry is normally used in International Freight Forwarders (IFFs) industry. Most of studies normally conducting a profiling research based on their own country. For example, (Murphy, Daley, & Dalenberg, 1992; Murphy, Daley, & M, 2001; Murphy & Daley, 1995, 1996) conduct a profiling of IFFs industry in US, while (Markides & Holweg, 2006) study the profile of IFFs in United Kingdom.

Dimensions

A wide variety of dimensions covered in the profiling of the logistics industry heavily on the research purpose. However, almost all articles found that discussing about the demographics characteristics of the industry. This shows that the industry demographics characteristics is the main idea or criteria needed in conducting profiling logistics industry research. From the analysis, the demographics characteristics in profiling logistics industry covered firm size, firm age, sources of revenue, logistics diversification and peak demand periods. All these elements are important in developing a profile of logistics industry. The firm size is the main element used by previous researchers in order to establish a profile of industry followed by the sources of revenue and logistics diversification. Firm age also has been as one of the important criteria in profiling logistics industry research. However, only one study used peak demand periods as a profiling variable. Table 3 shows the analysis of dimensions covered in profling logistics industry from previous literature.

Dimensions / Authors	Firm Size	Firm Age	Source of Revenue	Logistics Diversification	Peak Demand Period
(Murphy et al., 1992)	/		/		
(Richard & Judith, 1993)	/				
(Theodore et al., 1994)	/		/		
(Murphy & Daley, 1995)	/		/		
(Murphy & Daley, 1996)	/				
(Murphy et al., 2001)	/	/	/	/	/
(Murphy & Daley, 2002)	/		/		
(Johnson et al., 2004)	/	/			
(Murphy & Daley, 2004)	/	/	/	/	
(Markides & Holweg, 2006)	/		/	/	
(Lin, 2007)	/		/	/	
(Aihu & Hong, 2008)	/	/	/	/	
(Baregheh et al., 2012)	/	/		/	

Table 3 The dimensions covered in profiling logistics industry

The importance of profiling in logistics industry
Profiling in logistics industry is very important. The analysis from the previous study showed that profiling is important to compare the characteristics involved in the research. Previous authors also described that profiling is important because :-

1) The need for a structured information
2) Help researcher to study the future direction
3) To identify the overall situation/characteristics
4) To estimate the conlict exist/issues
5) Help to identify a strategies for future conflicts
6) To identify a definition of any services in logistics industry

Conclusion
The definition of profiling in other field of knowledge and in logistics perspectives almost the same. The main idea is to gather a data demographic characteristics of individual/human or non human in order to get a framework's subject of study. In profiling Malaysian logistics industry, the most suitable definition of profiling is the techniques used to collect a demographics data which is to construct a structure of logistics industry.

The dimensions that are proposed to proflie the Malaysian logistics industry are the elements used in Murphy et al.,(2001) the study on profiling International Freight Forwarders in US. The dimensions demographic characteristics which is include the element of firm size, firm age, sources of revenue, logistics diversification and demand periods. The replication of this previous study is beacuse the similarities and the suitabilities of the demographic characteristics which can be implement and conducts in Malaysian logistics industry. The information of the demographic characteristics of Malaysian logistics industry can provide a depth information on industry environment.

The importance of profiling Malaysian logistics industry is to establish a structure of logistics industry in Malaysia since there is still no single established data about logistics industry. Other than that, it is important to study the future direction of the industry, thus it gives a benefit to researcher to identify the conflict exist in the current market. Consiquently a strategies or action plan would be developed in order to overcome and solve any issues in the future. In Malaysia context, profiling is important, so that the definition of logistics industry would be defined since there is because there is no standard definition for Malaysian logistics industry. Profiling activities is very important to generate the structure or profile of the

industry. It is very crucial to have a standard definition and profile for the Malaysian logistics industry so that better policies could be formulated in future.

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EVALUATION OF AIR CONNECTIVITY OF CHIANG MAI AIRPORT

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Introduction

The number of global air transport passengers has increased considerably from 10,975 to 19,125 million of passengers in 2003-2012 as presented in figure 1. Additionally, figure 2 shows the continuous rise of the number of passengers in air transport in Thailand from 2009 to 2012. Besides, due to the forthcoming ASEAN Economic Community (AEC) in 2015, free flow of goods, service, investment, capital and labor will have expected influences on ASEAN member states and would lead to a substantial increase in air transport. Specific policy of AEC, such as revisions in „Open Skies" policy, may lead to expansion in new route and higher flight frequencies.

Thailand has 6 main international airports under operating of Airports of Thailand PLC. Chiang Mai airport is an important international airport in the North of Thailand. It has 24 destinations. The available capacity of this airport is 8 million of passengers per years while at the present (2014) it serves around 5.4 million of passengers per year. Surely, the number of passenger throughput at this airport will increase due to the global air transport passenger trend and the forthcoming ASEAN Economic Community (AEC) in 2015. The understanding of air connection is the basis to realize current airport performance and it may lead to preparing the readiness for supporting the incoming higher demand in the near future. Therefore, evaluation of Chiang Mai airport in terms of its connectivity indices would be important in determining air travel connections available to the consumer at Chiang Mai airport. The aim of this study is to realize the connectivity performances of Chiang Mai airport in the accessibility perspective.

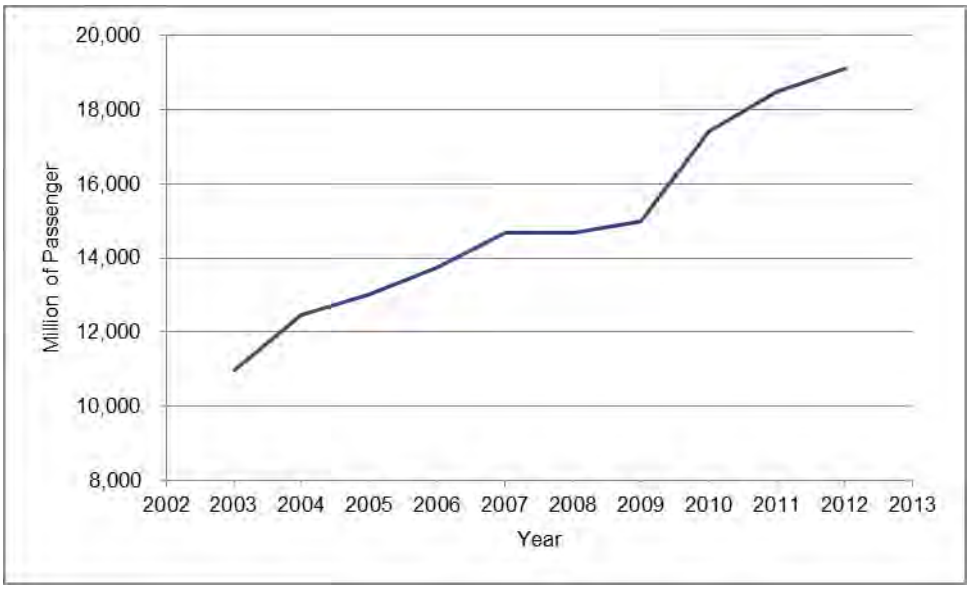

Figure 1: The world air transport, passengers carried (The World Bank, 2014)

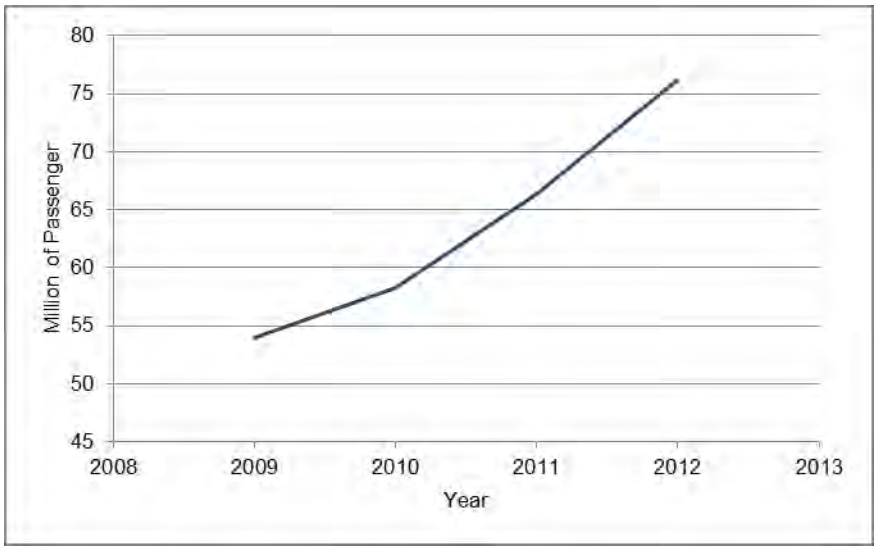

Figure 2: Air passenger throughput at 6 airports of Thailand under operating of Airports of Thailand PLC. (Airports of Thailand PLC., 2014)

Literature Reviews

There are some literatures concerning airport network study. In the framework of network analysis, airports represent nodes and individual routes represent the connections between them (Paleari et al., 2009). The resulting structure is interesting in terms of both topological features and what it reveals about network performance from the passenger"s perspective (Paleari et al., 2009). Malighetti et al. (2007) have investigated the connectivity of the European airport network by employing a time-dependent minimum path approach to calculate the minimum travel time between each pair of airports in the network including flight times and waiting times of each alliance. Another research employing a time-dependent minimum path approach to measure airport connectivity is Paleari et al."s paper (Paleari et al., 2009). They have done a comparative study of airport connectivity in China, Europe and US. This paper aims to analyze which network provides the best service to final passengers in term of travel time. The results showed no much difference in three networks. However, the principle of a time-dependent minimum path approach is 1) finding the number of connections lying of origin-destination quickest paths which the quickest path is the path involving the lower travel time from origin to destination (centrality perspective) and 2) finding the average travel time to reach any other airport in the network (accessibility perspective) (Burghouwt and Redondi, 2009). A time-dependent minimum path approach just focused travel times.

Another model for measurement connectivity performance of airport in the network is the NETSCAN model. Veldhuis (1997) has elaborated the origin and application of the NETSCAN model, the main variables in this model are frequencies and travel time. He had applied this model to analyze airline connections at Amsterdam airport. Additionally, the NETSCAN model was mentioned in the paper of Burghouwt and Veldhuis (2006). They measured the competitive position of hub airports in the transatlantic market by using the NETSCAN model. Matsumoto et al. (2009) have analyzed air network performance and hub competitive position of primary airports in East and Southeast Asia by using the NETSCAN model too. Besides, the NETSCAN model was mentioned in the working paper of Burghouwt and Redondi (2009). They have collected and analyzed the different of connectivity model used to measure the connectivity in air transport networks. They have identified the NETSCAN model to be a local connectivity model and also distinguished two basic perspectives on connectivity: (1) the accessibility perspective and (2) the centrality perspective (Burghouwt and Redondi, 2009). The NETSCAN model is the integrated model of variables like frequencies, travel time and the necessity of a transfer. Hence, this model is appropriate for measurement the airport connectivity to reflect number and quality of connections at a certain airport.

Definitions about air connection
There are some words or phase concerning the measurement of the air connections which have been described below:

Connection in air transport
Burghouwt and Veldhuis, (2006) have distinguished three types of connections: (1) Direct connections: flights between A and B without a hub transfer (e.g., from Amsterdam to Los Angeles) (2) Indirect connections: flights from A to B, but with a transfer at hub X (e.g., from Amsterdam to Los Angeles via Detroit) (3) Hub connections: connections via (with a transfer at) hub A between origin C and destination B (e.g., from Hamburg via Amsterdam to Los Angeles). In fact, hub connections are equal to indirect connections.

Connectivity
Burghouwt and Redondi (2009) said that according to graph theory, connectivity can be defined as the degree to which nodes in a network are connected to each other. Air transport research has brought forward a broad range of connectivity measures. Burghouwt and Redondi (2009) also cited Veldhuis, 1997; Burghouwt, 2007; Malighetti et al., 2008 that connectivity can be distinguished into two basic perspectives: (1) the accessibility perspective or (in)direct connectivity and (2) the centrality or hub connectivity perspective. Whereas the first perspective considers the number and quality of direct and indirect air travel connections available to the consumer at a certain airport, the second perspective measures the number of transfer opportunities available via a specific airport (see figure 3). Besides, Burghouwt and Veldhuis, (2006) also said that the measurement of indirect connectivity is particularly important from the perspective of consumer welfare. The concept of hub connectivity is particularly important for measuring the competitive position of airline hubs in a certain market.

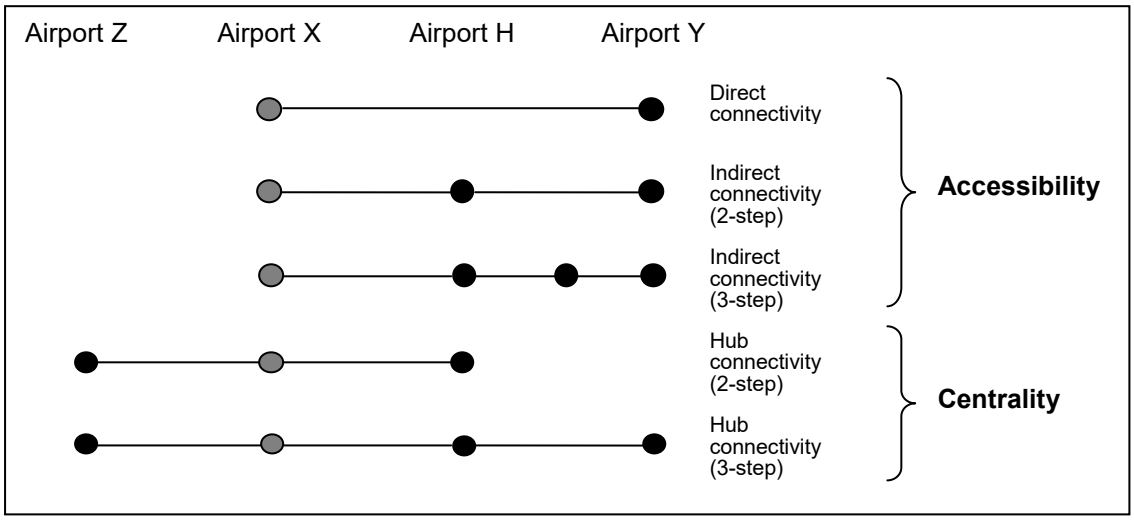

Figure 3: Type of connectivity at airport X (Burghouwt and Redondi, 2009)

On-line Connection
Business Dictionary (2014) defined on-line connection as change of aircraft not involving change of airlines. Additionally, Burghouwt and Veldhuis (2006) defined it as the transfer between two flights has to take place between flights of the same airline or global airline alliance.

Interline Connection
Business Dictionary (2014) defined it as air travel in which the same ticket covers different legs of the journey flown by different airlines.

Code share flight
It is two or more leg flight, covered by one ticket and sold by one airline, for a destination served not directly by it but through an affiliated airline (usually a commuter carrier). A code share flight uses the same two-letter carrier code during all legs of the journey. (Business Dictionary, 2014)

Method and Data

The NETSCAN model

From the previous researches (Veldhuis, 1997; Burghouwt and Veldhuis, 2006; Matsumoto et al., 2009), they said that the quality of an indirect connection is not equal to the quality of a direct connection. The operation of NETSCAN model is to quantify the quality of an indirect connection and scale it to the quality of a theoretical direct connection.

In air travel by plane, there are normally two connections for passengers (if the distance is long enough), direct or indirect connection. Passengers usually make a choice from the attractiveness of the available alternatives. Veldhuis (1997) said that attractiveness is often expressed in utility functions, where variables like available frequencies, their travel times and fares are weighted. He explained further that other factors like comfort, loyalty to airlines, specific preferences for certain airports or airlines do also play a certain role but they are hardly systematically available and even difficult to measure, so they are kept. For variable „fares", he explained that fares on certain routes change sometimes by the day and advanced yield managing systems, used by some major airlines, result in large differences of fares, so a systematic and coherent fare information system, representing the actual fares paid, is also not available (for more information about fares, please see Veldhuis, 1997). Hence, the NETSCAN model is constructed from the correlation of variables like frequencies, travel times and the necessity of a transfer for indicate route characteristics. The output of calculation by the NETSCAN model expressed in so called „connectivity units" (CNU).

From the studies of Veldhuis (1997) and Matsumoto et al. (2009), summarizing the following model has been applied;

NST	=	(40+0.068*gcd km) / 60	(1)
MAXT	=	(3-0.075*NST)*NST	(2)
PTT	=	FLY+ (3-0.075*NST)*TRF	(3)
QUAL	=	1- ((PTT-NST)/(MAXT-NST))	(4)
CNU	=	QUAL* FREQ	(5)

Where NST is the on-stop travel time in hours, gcd km is the great-circle distance in kilometre, MAXT is the maximum perceived travel time in hour, PTT is the perceived travel time in hour, FLY is the flying time in hour, TRF is the transfer time in hour, QUAL is the quality index of an individual connection, FREQ is the frequency per week and CNU is the number of connectivity units.

This paragraph is description about a quality index, an important variable in the NETSCAN model, which Burghouwt and Veldhuis (2006) have said in their work. NETSCAN assigns a quality index to every connection, ranging between 0 and 1. A direct, non-stop flight is given the maximum quality index of 1. The quality index of an indirect connection will always be lower than 1 since extra travel time is added due to transfer time and detour time of the flight. The same holds true for a direct multi-stop connection: passenger face a lower network quality because of en-route stops compared to a nonstop direct connection. Additionally, if the additional travel time of an indirect connection exceeds a certain threshold, the quality index of the connection equals 0. The threshold of a certain indirect connection between two airports depends on the travel time of a theoretical direct connection between these two airports. In other words, the longer the theoretical direct travel time between two airports, the longer the maximum indirect travel time can be.

The conditions for using the NETSCAN model: (1) specification minimum connection time and a limit on the maximum connecting time, in the previous research, they specified 45-60 minutes connection times and 24 hour maximum connecting time. (2) Only on-line connections are considered as viable connections including code share flight (Veldhuis, 1997; Burghouwt and Veldhuis, 2006).

For evaluation air connectivity of Chiang Mai airport in accessibility perspective, the author used the NETSCAN model to calculate the connectivity indices in each flight between Chiang Mai airport and others. Next, summary is done for making total connectivity units in each route. The analysis only considers the connectivity between Chiang Mai airports and other airports in Thailand and in ASEAN. The return connections have not been considered in this analysis. The authors used the commercial flight schedules data in the third week of October in 2014 from „Wego" and „Jetradar" website (Wego, 2014; Jetrada, 2014). We only focus on passenger flight. Additionally, in this paper, the minimum connection time at a specific airport is 45 minutes and a limit on the maximum connecting time is 24 hours.

Research Findings

Figure 4 and figure 5 show the total direct and indirect connectivity units at Chiang Mai airport in the third week of October in 2014. As presented in figure 4, CNU of indirect connections are equal zero. In practice, there are indirect connections served to customers but the indirect connections are not attractive (quality index equals zero) for traveling in domestic routes. Because flight distances of these domestic routes are quite short, the theoretical direct travel time between two airports is small. Due to a small amount of theoretical direct travel time between these two airports, the maximum indirect travel time in each indirect connection is small. So, the travel time of an indirect connection exceeds its maximum indirect travel time easily. According to the NETSCAN model, the quality index of indirect connections of 8 routes equal 0. Surely, their CNU are zero too (see equation 5). There are 8 routes from Chiang Mai airport to airports in Thailand in the third week of October in 2014. All 8 destinations include Don Mueang airport, Hat Yai airport, Kra Bi airport, Mae Hong Son airport, Phuket airport, Samui airport, Suvarnabhumi airport and Udon Thani airport. Chiang Mai airport-Don Mueang airport route has the highest connectivity units (203 CNU). It means that this route has the highest number and quality of air travel connections available to the consumer. In other word, passengers have more choices to travel because it has more flights per week. Total CNU of the route from Chiang Mai airport to Suvarnabhumi airport is the second (112 CNU). The connectivity units of these two routes are high when compared with others. It may be because these two destinations are in the capital of Thailand, Bangkok. Noticeably, CNU of Chiang Mai airport-Don Mueang airport route is higher than CNU of Chiang Mai airport-Suvarnabhumi airport route almost two times. It may be because the demand of low cost carrier (Don Mueang airport is Thai hub of low cost carrier) on domestic traveling. Additionally, total CNU of the route from Chiang Mai airport to Phuket airport is the third (35 CNU). Phuket airport is in Phuket which is a famous province in tourism. The fourth is the route from Chiang Mai airport to Mae Hong Son airport (23 CNU) which is the nearest airport of Chiang Mai airport. Additionally, the remainder routes are the routes from Chiang Mai airport to Kra Bi airport (14 CNU), Hat Yai airport (7 CNU), Samui airport (7 CNU) and Udon Thani airport (7 CNU). These destinations are in the regions of Thailand. Kra Bi airport, Hat Yai airport and Samui airport are in the South of Thailand. And Udon Thani airport is in the Northeast of Thailand. Hence, the number of connections from Chiang Mai to these destinations is not high.

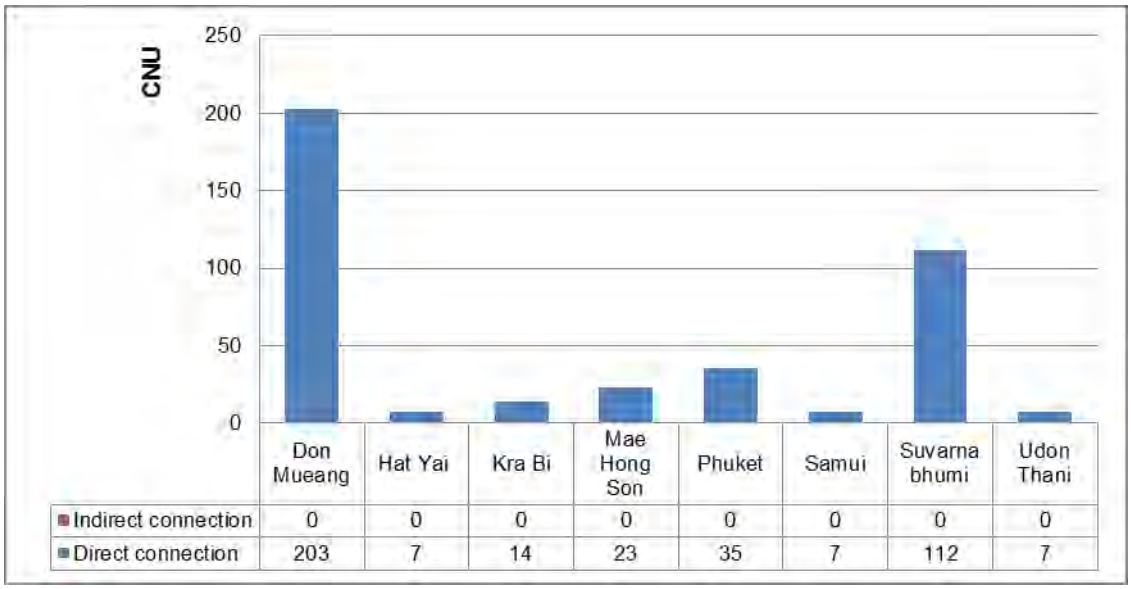

Figure 4: Connectivity units of 8 routes, from Chiang Mai airport to 8 domestic destinations in 2014.

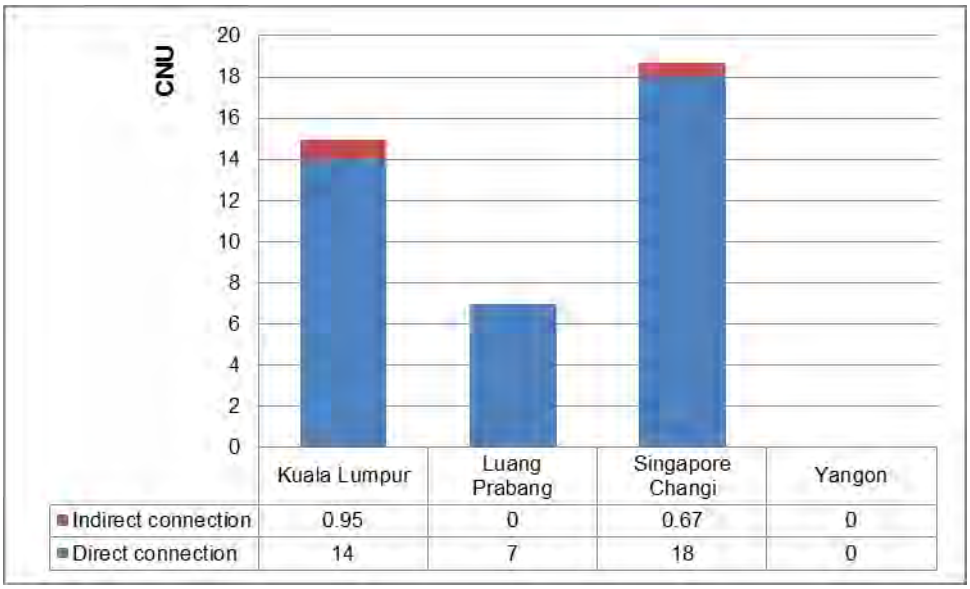

Figure 5: Connectivity units of each route, from Chiang Mai airport to airports in ASEAN market

Figure 5 presents total connectivity units of the routes from Chiang Mai airport to four destinations in ASEAN including Kuala Lumpur airport, Luang Prabang airport, Singapore Changi airport and Yangon airport. The number and quality of connection from Chiang Mai airport to Singapore is the highest. This route can serve high quality and frequencies to customer. The second is Chiang Mai airport-Kuala Lumpur airport route. Additionally, Chiang Mai airport-Luang Prabang airport route is the third of rank and the indirect connection in this route is not attractive to customer (CNU equals zero). Furthermore, there are not direct connections from Chiang Mai airport to Yangon airport (in October 2014 period). There are only indirect connections but they are not attractive to customers because of additional travel time. In ASEAN market, the ratios of indirect connectivity and direct connectivity are very low. They imply that direct connection is more appropriate to travel in ASEAN than indirect connection.

Summary findings

This study shows the connectivity performances of Chiang Mai airport in the accessibility perspective. Chiang Mai airport has 12 destinations composed of 8 domestic destinations and 4 ASEAN destinations. Domestic destinations include Don Mueang airport, Hat Yai airport, Kra Bi airport, Mae Hong Son airport, Phuket airport, Samui airport, Suvarnabhumi airport and Udon Thani airport. Additionally, ASEAN destinations consist of Kuala Lumpur airport, Luang Prabang airport, Singapore Changi airport and Yangon airport. For traveling in domestic market from Chiang Mai airport, direct connections are good for customer and indirect connections maybe not necessary. Additionally, for traveling in ASEAN market from Chiang Mai airport, direct connections are good for customers too and indirect connections can be some choices for customers in some route like Chiang Mai airport-Kuala Lumpur airport route. Indirect connection will be better if the connection time at a hub airport is low.

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GREEN LOGISTICS SERVICE QUALITY AND LSP PERFORMANCE

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Introduction
Effective and efficient logistics services can enhance the firm's competitive advantage. Therefore, logistics management can be considered as a key component of organisational effectiveness and success (Khan and Burnes, 2007). At the same time, environmental or green issues in logistics service offerings have attracted much managerial attention in the logistics industry for the future. One important objective is for logistics service providers (LSPs) to deliver their service offerings to customers in more environmentally friendly ways. The study is ongoing project and investigates variables and constructs of green service quality, logistics service quality and logistics performance index in Thailand. The purpose of this paper is to report on an ongoing research study to understand the importance of green service quality (GSQ) and logistics service quality (LSQ) in the performance of logistics service providers (LSPs) in a Thai context.

Theoretical Background
The empirical research for this paper was based on an extensive literature review in three key areas: LSP performance, LSQ, and GSQ. For this study, GSQ has been defined from perceptual service quality or SERVPERF constructs as the environmental initiatives crucial to operational service quality, particularly in logistics service provision. Many studies have been conducted on the relative effectiveness of the service performance measurement (SERVPERF) and the SERVQUAL approach (Cronin and Taylor, 1994).

LSQ and LSP Performance
LSQ has been developed and studied by many researchers but the recognised research was done by Mentzer et al. (1989). They proposed that LSQ consisted not only in the physical distribution aspects of services, but also included other customer service elements. Mentzer et al. (1989) proposed that the logistics service quality scale should be composed of nine dimensions as follows information quality, ordering procedure, ordering release quantity, timeliness, order accuracy, order quality, order condition, order discrepancy handling and personnel contact quality.

Several LSP-LSQ studies have been conducted (Millen et al., 1997; Mentzer et al., 1999; Wilding & Juriado, 2004; Rafele, 2004; Aktas & Ulengin, 2005; Rafiq & Jaafar, 2007; Banomyong & Supatn, 2011), but there is a lack of studies investigating the performance of an LSP's LSQ. Only nine items or variables of logistics service quality within the 20 articles reviewed in this study, either in discussions or as a result of empirical testing are considered (Chaisurayakarn et al., 2013). These items are Information Quality, Order Procedures, Order Release Quantities, Timeliness, Order Accuracy, Order Quality, Order Condition, Order Discrepancy Handling, and Personnel Contact Quality.

GSQ and LSP Performance
Environmental performance measurement can be a critical aspect in LSPs' environmental offering (Björklund et al., 2012). However, to be considered as having regards for environmental sustainability, companies need to focus on these bottom lines: social, economic, and environment (Elkington, 1998). Only nine items or variables of green service quality within the 20 articles reviewed in this study, either in discussions or as a result of empirical testing, are considered as shown in Table 1.

Green service quality	Explanation
Alternative fuels	Bio fuels and renewable energy
Vehicle technologies	Replace existing fleets with modern vehicles that cause less emissions
Modal choice	Shift from road to rail; intermodal solutions
Behavioural aspects	Eco driving; driving behaviour which focuses on decreasing fuel consumption
Logistics system design	More direct transport; continuous improvement of distribution networks; decrease average handling factor and average length of haul
Transport management	Well planned routes; high fill-rates
Choice of partners	Cooperation with customers to help them reach their own environmental targets; choosing environmentally conscious transport providers
Environmental management system (EMS)	ISO14001, EMS certification
Externalities	CO_2 reports; energy consumption from external transports; energy consumption in warehouse; greenhouse gas emissions; safety for both driver/staff and other people

Table 1: Green Service Quality Items (Elkington, 1998; Martinsen & Bjorklund, 2012)

Methodology

This empirical study found evidence of these green/environmental issues in a specific logistics service context. The paper is based on empirical data collected via a survey delivered to logistics managers working in LSPs and LSP customers companies. An Interview and a survey were used as appropriate methods for this study as discussed at the LRN in 2013 (Chaisurayakarn et al., 2013).

Twenty-eight GSQ variables and twenty-four LSQ variables for investigation are developed from an extensive literature review of 40 articles on green/environmental logistics, logistics service quality and performance obtained from the major logistics and marketing journal. Moreover, five Thai LPI variables as transport costs per sales ratio, order cycle time, delivery cycle time, delivered in-full on-time (DIFOT), and returned rates shown in performance construct are developed from the Thailand Logistics Performance Index (Chaisurayakarn et al., 2013). The main study model addresses three key constructs as GSQ, LSQ and Performance shown in Figure 1.

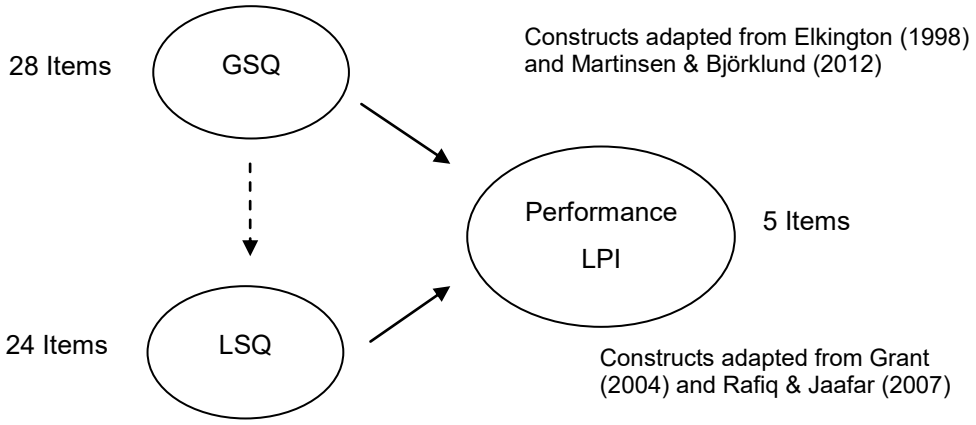

Figure 1: Proposed Main Study Model

Findings

The questionnaire survey is selected in this stage to find what are GSQ and LSQ competencies and also the importance of GSQ competencies related to LSQ competencies in the context of Thai LSPs. After the interview step to explore what meaningful, logistics industry-recognised green service quality competencies are, the survey is conducted with two groups of respondents: LSPs providing transportation services and LSPs customers in five main industries: Food; Textile; Electronics and

Parts; Automobile and Parts; and Plastic industries. Both groups of respondents are located or provide their services within the areas of Bangkok, Central and Eastern Thailand.

Demographic Analysis

As discussed that LSPs and LSP customers respondents are located or provide their services within the areas of Bangkok, Central and Eastern Thailand, it is seen that LSP respondents are mostly in business for between 6 to 25 years (80 percent of the total LSP respondents) whereas almost 70 percent of the total LSP customer respondents are in business for 11 to 25 years, as shown in Figure 2. However, the number of years in business of the respondent's company may be one factor that has an influence to the perceptions of LSPs and LSP customers to the GSQ and LSQ competencies related to LSP performance in the Thai context as discussed in the next part.

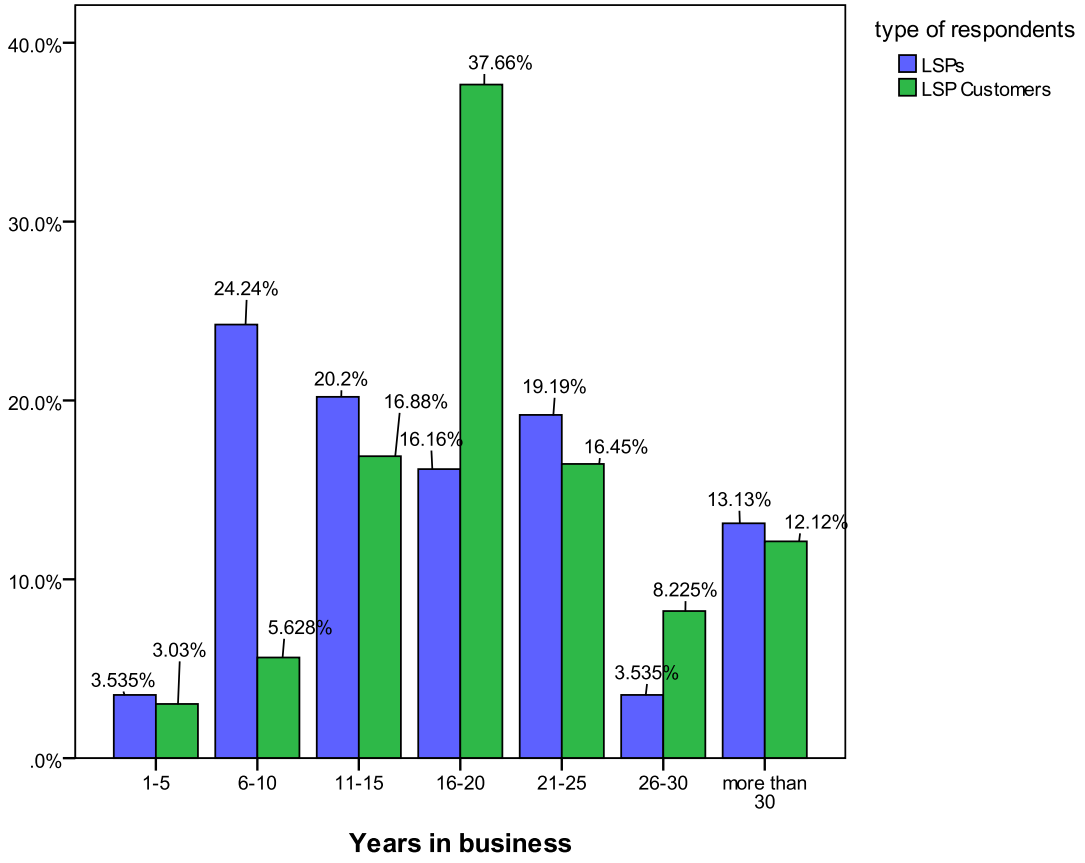

Figure 2: Years in Business of the Respondent's company

The Office of Small and Medium Enterprises Promotion (2014) has classified the type of size of companies in Thailand into 3 types as Small enterprises (1-50 employees in the company); Medium enterprises (51-200 employees); and Large enterprises (more than 200 employees). From Figure 3, it is seen that most of respondents from LSPs are small and medium enterprises (SMEs) as almost 90 percent of total LSPs whereas most of respondents from LSP customers are medium and large enterprises as 95 percent of total LSP customers.

Considering the interactive two variables between the average number of employees and the ownership structure of the respondent's company, it appears that most of LSP respondents are total Thai-owned SMEs while most of LSP customer respondents are multi-national companies (MNCs) which are corporate companies. Interestingly, there is any influence of these two variables relating to the importance of GSQ and LSQ variables in the perceptions of LSPs and LSP customers or not. Following with the question above, Table 2 to 9 will show the similarities and differences of the importance of GSQ and LSQ in the perceptions of LSPs and LSP customers.

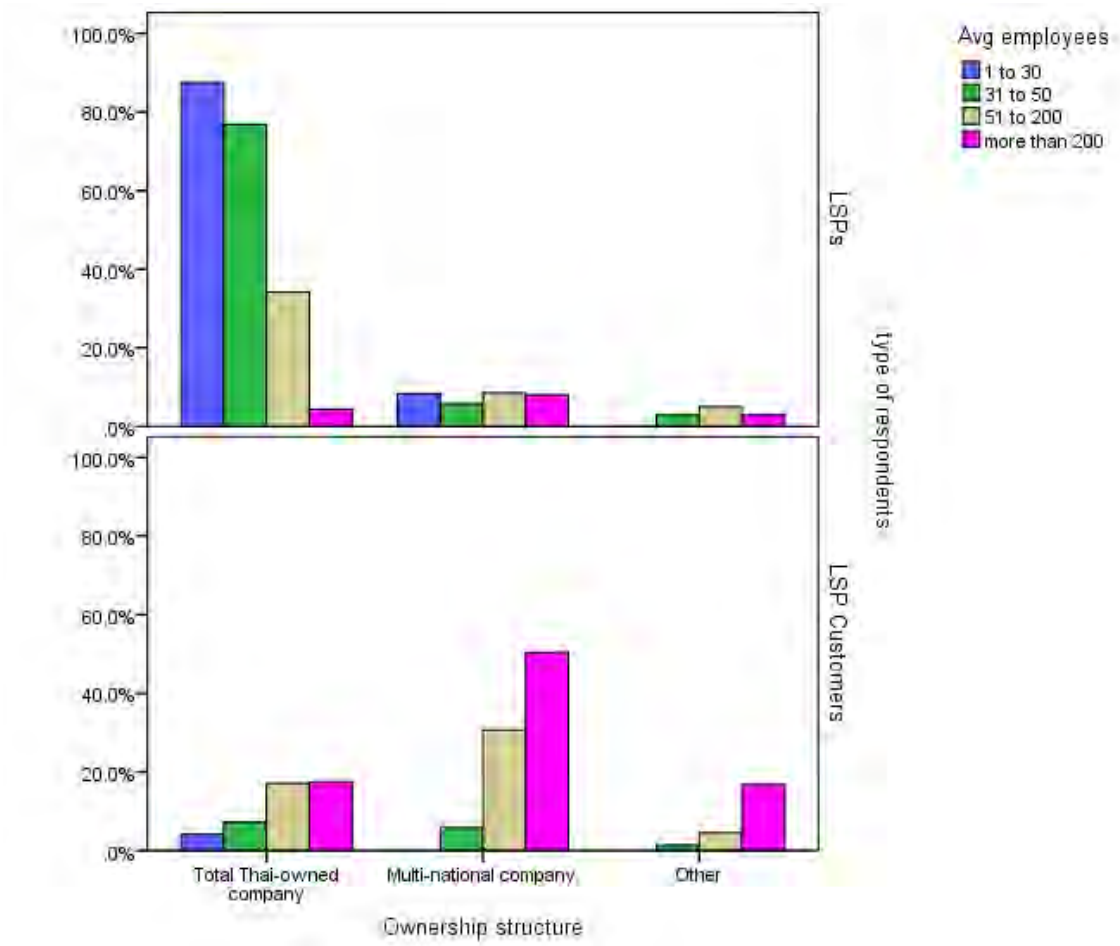

Figure 3: Ownership Structure of the Respondent's Company

Differences of the importance of GSQ and LSQ in the Perceptions of LSPs and LSP Customers
The mean and standard deviations from the perception of LSPs and LSP customers to the importance of GSQ and LSQ variables are calculated for each variable. The LSPs-GSQ perception sum of means of 163.3 marginally exceeded the LSP customers-GSQ perception sum of means of 160.88 as shown in Table 2. The +2.5 difference indicates LSPs' perceptions in GSQ importance exceeded LSP customers' perceptions. Seven variables have absolute t-test values greater than 1.96 that indicate significant differences between means and all variables have positive t-test values. That means LSPs exceed perceptions for these variables and respondents rate the importance level of GSQ variables.

GSQ variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
GS1 - Alternative fuel - fuel cost	6.11	.757	5.89	.794	2.905	.004
GS2 - Alternative fuel – corporate image improvement	5.83	.843	5.53	1.106	3.074	.002
GS15 - Logistics system design - product availability	5.77	.798	5.55	.800	2.761	.006
GS18 - Transport management - back haul reduction	6.14	.804	5.97	.854	2.124	.034
GS20 - Partners choice - environmental targets achievement	5.90	1.021	5.68	1.060	2.266	.024
GS21 - Partners choice - environmental collaboration enhancement	5.91	.908	5.68	1.014	2.497	.013
GS23 - EMS - waste decrease within operations & processes	6.13	.824	5.92	.931	2.437	.015
Sum of Means (all GSQ items)	163.30		160.88			

Table 2: Difference of Green Service Quality Variables in the Perceptions of LSPs and LSP Customers

The LSP-LSQ perception sum of means of 148.71 marginally exceeded the LSP customer-GSQ perception sum of means of 146.91 as shown in Table 3. The +1.8 difference indicates LSPs' perceptions in LSQ importance exceeded LSP customers' perceptions. Three variables have absolute t-test values greater than 1.96 that indicate significant differences between means and all variables have positive t-test values. That means LSPs exceed perceptions for these variables and respondents rate the importance level of LSQ variables.

LSQ Variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
LS1 - Order release quantities - flexibility to deliver	6.06	.755	5.86	.814	2.602	.010
LS9 - Personnel contact quality - problem resolved	6.11	.898	5.93	.884	2.083	.038
LS10 - Personnel contact quality - knowledge/experience	6.19	.794	5.97	.911	2.611	.009
Sum of Means (all LSQ items)	148.71		146.96			

Table 3: Difference of Logistics Service Quality Variables in the Perceptions of LSPs and LSP Customers

However, when looking at the importance of GSQ competencies related to LSP competencies, it seems that both LSPs and LSP customers perceive the importance of these two main competencies. LSP customers, more than LSPs, perceive GSQ is important to LSP performance. However, both similarly perceive the importance of LSQ to LSP performance. In summary, LSPs respondents marginally report perceptions exceed LSP customers for the important variables. However, they report perceptions less LSP customer for the importance of GSQ competencies relate to LSQ competencies in Thai LSPs.

Variables	LSPs Mean	σ	Customers Mean	σ	t-test	Sig (2 tail)
Importance of GSQ relate to LSQ	5.46	1.406	5.81	1.136	-2.844	.005

Table 4: Importance of GSQ relate to LSP in the Perceptions of LSPs and LSP Customers

As discussed that there are differences between the average numbers of employees in the LSP and LSP customer respondent's company significantly, it is wondering that there is any differences of GSQ and LSQ variables in the perceptions of LSPs and LSP customers in this context. From Table 5, three variables have absolute t-test values greater than 1.96 that indicate significant differences between means and all variables have positive t-test values. That means large LSPs companies (more than 200 employees in the companies) exceed perceptions for these variables and respondents rate the importance level of GS26-27 and LS1 variables. There is no difference of GSQ and LSQ variables in the perception of LSP customer in the context of the average numbers of employees.

As same as the differences of GSQ and LSQ variables in the context of the ownership structure of the company affect only to the perception of LSPs as shown in Table 6. Three variables have absolute t-test values greater than 1.96 that indicate significant differences between means and all variables have positive t-test values. That means the MNC LSPs companies exceed perceptions for these variables and respondents rate the importance level of GS20, LS3 and LS16 variables. It can say that MNCs LSPs have more effective and efficiency in their process in term of the order accuracy, order procedures, and partnership than Thai-owned LSP companies. It is concluded that the average number of employees can make the differences on the GSQ variables rather than LSQ variables in the perception of LSPs whereas the ownership structure of company can make the differences on the LSQ variables rather than GSQ variables in the perception of LSPs.

LSP and LSP customers' types of businesses are also one variable that this study is focusing as shown in Table 7 and 8. Four variables indicate significant differences between means and all variables have positive t-test values. Not surprisingly that Electronics & Parts industry exceed perception of the importance for product availability (GS7) variable as availability and speed factors are quite importance of electronics product (Mason-Jones et al., 2000). On the one hands, Food industry exceed perception of the importance for personnel contact quality (LS8-10) variables. Moreover, there is one difference for the GS3 variable of the perceptions of LSP types of business and

transport, logistics and other related to transport business companies rate the importance of product availability on the alternative fuels.

Variables	1-30 Mean	σ	31-50 Mean	σ	51-200 Mean	σ	More than 200 Mean	σ	F	Sig
LSPs										
GS26 - Externalities - CO_2 emission from awareness of LSP stakeholders	5.00		5.40	1.506	5.60	1.219	5.93	1.044	4.842	.003
GS27 - Externalities - environmental aspects changes	5.09	1.203	5.63	1.032	5.84	.926	5.95	.973	4.088	.008
LS1 - Order release quantities - flexibility to deliver	5.70	.822	6.17	.791	5.99	.692	6.43	.676	4.349	.005

Table 5: Difference of Variables in the LSPs and LSP Customers' Perceptions and the Average Number of Employees in Company

Variables	Total Thai-owned company Mean	σ	MNCs Mean	σ	Others Mean	σ	F	Sig
LSP								
GS20 - Partners choice - environmental targets achievement	5.79	1.064	6.35	.734	6.00	.894	4.424	.013
LS3 - Order accuracy - wrong items	6.12	.856	6.53	.507	6.56	.629	5.228	.006
LS16 - Ordering procedures - flexible	5.97	.760	6.35	.485	6.00	.816	3.950	.021

Table 6: Difference of Variables in the LSPs and LSP Customers' Perceptions and the Ownership Structure of Company

Variables	Food Mean	Textile Mean	Plastic Mean	Automobile Mean	Electronics Mean	Others Mean	F	Sig
GS7 - Transport modal choice - product availability	5.50	5.13	5.37	5.47	5.91	5.92	4.139	.001
LS8 - Personnel contact quality - understand situation	6.29	6.06	5.37	5.99	6.06	6.18	4.598	.001
LS9 - Personnel contact quality - problem resolved	6.25	5.56	5.27	6.00	6.00	6.10	5.696	.000
LS10 - Personnel contact quality - knowledge/experience	6.25	6.00	5.33	5.96	5.89	6.26	4.929	.000

Table 7: Difference of Variables in the Respondents' Perceptions and the LSP Customers Types of Businesses

Variables	Transport Mean	Warehouse Mean	Logistics Mean	Packaging Mean	Others related to transport Mean	F	Sig
GS3 - Alternative fuel - product availability	5.65	4.54	5.77	4.25	5.60	4.278	.002

Table 8: Difference of Variables in the LSPs' Perceptions and the LSP Types of Businesses

Average employees in the respondent's company	Type of respondents	order cycle time Mean	σ	F	Sig	Delivery cycle time Mean	σ	F	Sig
1 to 30	LSPs	1.39	.722			2.04	.706		
	LSP Customers	5.00				7.00			
31 to 50	LSPs	1.88	.930			2.78	1.161		
	LSP Customers	1.90	.738			2.80	1.033		
51 to 200	LSPs	1.84	.803			2.77	1.198		
	LSP Customers	2.23	1.256			3.18	1.205		
more than 200	LSPs	2.19	1.569			3.05	1.071		
	LSP Customers	2.34	1.223			3.21	1.262		
Average employees (Employ)				2.404	.067			2.771	.041
Type of respondent (Type)				11.543	.001			17.800	.000
Employ * Type				3.271	.021			5.262	.001

Table 9: Difference of Performance Variables in the LSPs & LSP Customers' Perceptions and Types of Respondents & Average Employees in Company

From Table 9, it shows that there is interaction between the two variables (p values < 0.05). The effects of the average employees in the respondent's company on the order cycle time and delivery cycle time indicators seem to be different for the perceptions of LSPs and LSP customers. It is reasonable to believe that the difference in on the order cycle time and delivery cycle time indicators between the perceptions of LSPs and LSP customers are the difference for all range of average employees in the respondent's company. When looking at the main effects of the types of respondent groups: LSPs and LSP customers, the significant level are 0.001 and 0.000 respectively. That means the variable Type of respondent group has influence on the order cycle time and delivery cycle time indicators. The average employees of the respondent's company has influence on only the delivery cycle time indicator as shown at the significant level 0.041.

On the other hands, there is no interaction between the two variables on the transport cost per sales ratio, DIFOT, and returned rates as p values > 0.05. Conclusions, it can say that every size of companies, representing by the average employees of the respondent's company, LSP customers respondents marginally report perceptions exceed LSPs for the order cycle time and delivery cycle time.

Conclusions

Environmental or green issues in logistics service offerings have attracted much managerial attention in the logistics industry sector. One important opportunity is for logistics service providers (LSPs) to deliver their service offerings to customers in more environmentally friendly ways. While this topic has been fairly well-researched in UK and European settings, it remains under-researched in developing countries such as Thailand. While most of the green logistics studies focus on the supply chain management or logistics system's characteristics, this paper investigates initial insights into how important green aspects are relative to logistics service quality and Thai LSP performance.

A practical contribution for both LSPs and their customers is an understanding of how LSPs can focus on GSQ to perform better, which is important to customers and hence better compete with rivals. Similarities and differences in expectations and perceptions of the main relationships also provide guidance for LSPs to reduce their LSQ gap with customers and increase their capabilities to achieve higher customer satisfaction.

From the findings above, it is concluded that LSP customers, more than LSPs, perceive GSQ is important to LSP performance significantly. Variables types of businesses and the ownership structure of the respondent's company are quite influent on the importance of GSQ and LSQ variables in the perceptions of LSPs and LSP customers. Lastly, every companies size, representing by the average number of employees of the respondent's company, LSP customers respondents marginally report perceptions exceed LSPs for both of the order cycle time and delivery cycle time.

A limitation is that this paper only reports preliminary findings of an ongoing study. It can be seen from the similarity and difference of GSQ and LSQ competencies on LSP Performance as discussed above. The impact of green logistics service quality on LSP performance will be measured. Exploratory Factor Analysis (EFA), Confirmatory (CFA) and structural equation modelling (SEM) will be conducted in the next step.

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TRADE TRENDS OF MANUFACTURED GOODS WITHIN AEA ZONE

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Introduction

No nation is self-sufficient in a global economy. Each is involved at different levels in trade to sell hat it produces, to acquire what it lacks and also to produce more efficiently in some economic sectors than its trade partners. The globalization of production is concomitant to the globalization of trade as one cannot function without the other. Keeping pace with developing human demand, trade has been occurring at an ever increasing scale over the last 600 years to play an even more active part in the economic life of nations and regions. This process has been facilitated by significant technical changes in the transport sector. (Rodrigue, 2013)

The scale, volume and efficiency of international trade have all continued to increase since the 1970s, creating a more extensive market coverage that can be accessed faster & at a lower cost. It has become increasingly possible to trade between parts of the world that previously had limited access to international transportation systems. Further, the division and the fragmentation of production that went along with these processes also expanded trade, all of which are topics addressed in this research. Trade facilitates the distribution of a wide range of manufactured goods, the subject commodity division of the present paper, that are produced in different parts of the world to what can be labeled as the global market. Wealth becomes increasingly derived through the regional specialization of economic activities. This way, production costs are lowered, productivity rises and surpluses are generated, which can be transferred or traded for commodities that would be too expensive to produce domestically or would simply not be available. As a result, international trade decreases the overall costs of production worldwide. (Rodrigue, 2013)

This overall & continuous rise in trade quantity has come despite the fact that scholars still believe that geographic distance is an inherent impediment to trade, or as one might like to put it, "Distance Hasn't Died Yet". (Panahi, 2007., Berthelon and Freund, 2007., Brun and Carrere, 2002). This explains the tight relationship between trade & development, where economic growth may even be sought in interaction with the most distant regions of the globe. (Ghadari Faraz, 2011)

The present research aims to reveal trade trends of Manufactured Goods, Classified Chiefly by Material (registered under Code 6 in the Standard International Trade Classification) throughout Europe, Asia & Africa (abbreviated as AEA) between 1965 & 2005. The category is further subdivided into 9 distinct commodity branches which will be mentioned later on. Trade value and weight trends for all subcategories were obtained, respectively, in terms of US Dollars & kilograms based on data extracted from UN Comtrade online database for the 40 year time span mentioned. Results clearly illustrate prevailing trade value & weight directions within the Europe-Asia- Africa zone for manufactured goods. Moreover, the presence of strategic trade items such as steel, iron, cement, fabricated construction materials, precious stones and metals such as silver and platinum in this category might add to the importance of this appraisal.

Commodity Classification Details

SITC (Standard International Trade Classification) is a classification of the commodities being subject to international trade. It was designed to help provide a categorization needed for economic analysis and to facilitate the international comparison of trade data. A single numeral represents a major category (e.g. 6 for Manufactured goods classified chiefly by material) and each subsequent numeral represents a sub-classification that can reach up to five numerals. For instance, Articles of natural cork (633.1) is a subcategory of Cork manufactures (633), which in turn, is a subcategory of Cork and wood manufactures (excluding furniture) (63) itself. [II] The hierarchical structure of the classification is as follows:

- Sections - One-digit codes; - Divisions
  - Two-digit codes; - Groups
  - Three-digit codes; - Subgroups
  - Four-digit codes; - items
  - Five-digit codes; - [I]

The studied 'Section' & its divisions are as follows (first and second digits):
'Manufactured goods classified chiefly by material' (Code 6):

- 61 - Leather, leather manufactures, n.e.s., and dressed furskins
- 62 - Rubber manufactures, n.e.s.
- 63 - Cork and wood manufactures (excluding furniture)
- 64 - Paper, paperboard and articles of paper pulp, of paper or of paperboard
- 65 - Textile yarn, fabrics, made-up articles, n.e.s., and related products
- 66 - Non-metallic mineral manufactures, n.e.s.
- 67 - Iron and steel
- 68 - Non-ferrous metals
- 69 - Manufactures of metals, n.e.s. [II]

Data Collection
Data for trade value between 125 countries of Asia-Europe-Africa were extracted from the UN Comtrade online databank [III] in 5 year intervals between 1965 & 2005, i.e. the years 1965, 1970, 1975,1980, 1985, 1990, 1995, 2000 and 2005, resulting in 9 sets of information. This collection was performed by Java programming-based Data Crawling. The output of the procedure was 162 sets of unique 125*125 matrices containing prices of trade in all divisions & years mentioned above, where import and export figures appear in separate matrices. Trade weight statistics on the other hand were gathered from bilateral trade standings between several countries within the AEA region that were thought to be best representative of trade trends & had the least number of missing data. Having acquired both value & representative weight information for trade of manufactured goods, a coefficient indicating commodity unit weight price ($/kg) for every single division & year of trade was established. When applied to value matrices, these coefficients would yield the same number of trade weight matrices for all the 125 countries involved. All in all, considering 18 sets of 125*125 separate import/export matrices for 9 divisions of commodity, a total number of 2531250 trade value data were mined and employed in the analysis.

Data Analysis and Modeling
Collected data was sorted, organized & adjusted in desired configuration by means of MATLAB programming. The extracted value matrices contained missing elements which had to be omitted from calculation and analysis. Each of these missing entries reflect missing trade data for a particular commodity division in a particular year & might in turn, implicate either unreported trade data or no existing bilateral trade for that specific code-year. These data were indexed & treated as missing values in MATLAB and thus didn't appear in the final analysis. As mentioned before, all valid data were processed and sorted (by MATLAB programming) such that all import and export trade information for every trade item could be summed up for each year of study. The next step was to form an average for available import and export trade data of all 125 countries. This resulted in a single number representing the overall value of trade in US dollars for each code – at the second digit level also called "commodity division"- in each year. These discrete numbers are plotted against time (Figure 1) and regression models are applied to each individual curve (Table 1). Thus, each individual curve depicts the trade value trend for a specific division of the "Manufactured Goods" section. The same exact procedure was applied to weight data and the results are tabulated in Figure 2.

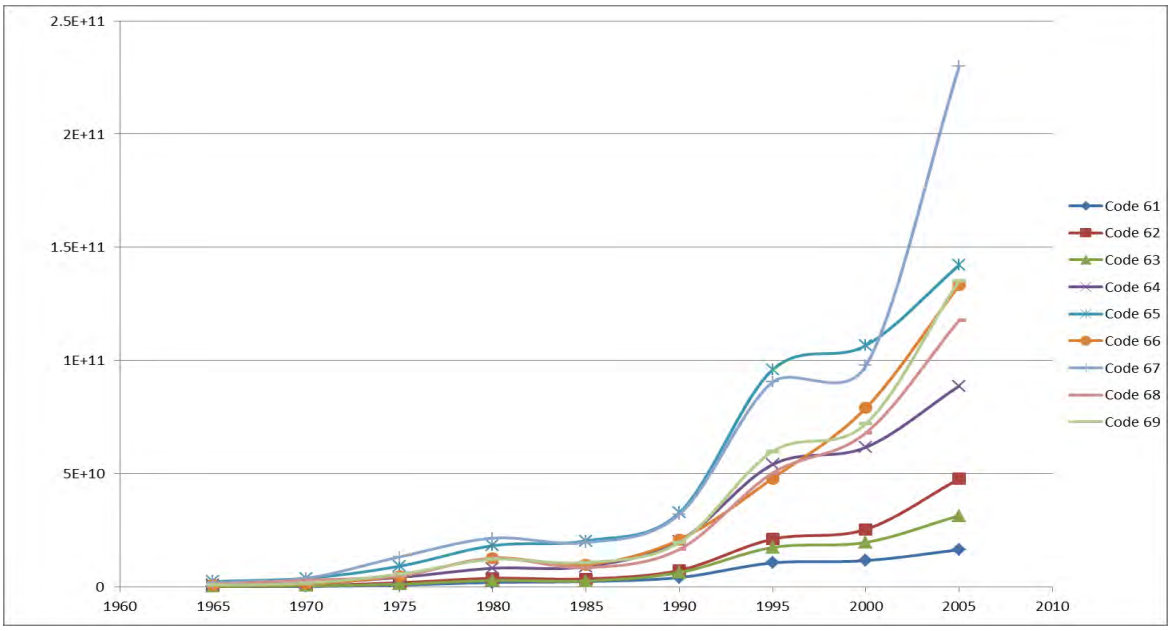

Figure 1: Average Trade *Value* amongst 125 AEA States Against Time (US$) (1965-2005)

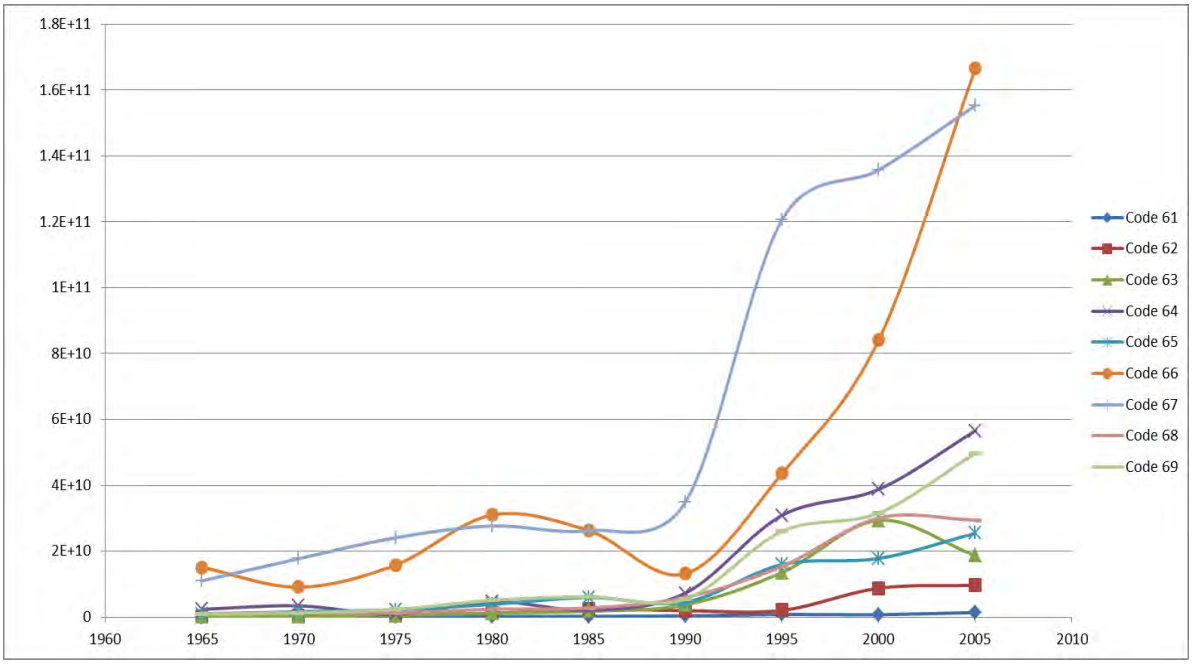

Figure 2: Average Trade *Weight* amongst 125 AEA States Against Time in Kilograms (1965-2005)

Then, to illustrate the general observed trade trend of SITC section 6 as a whole (Code 6) throughout the 40 year period, an aggregate (cumulative) curve of trade value & weight is presented below (Figure 3). Each point represents the sum total of all trade weight and values pertaining to a specific division code, in a specific year of study, i.e. weight and values of divisions 61, 62, 63, …., 69 altogether accumulated to form a single number representing the whole amount of trade weight and value for Code 6 per year (at the "Section" or first digit level).

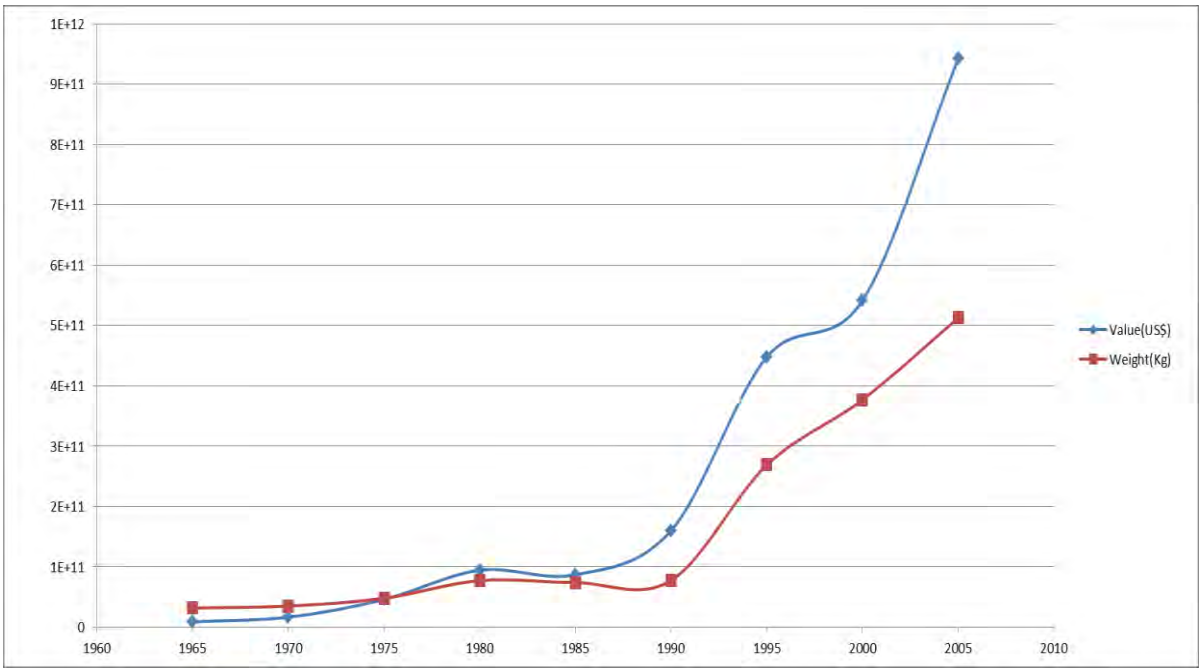

Figure 3: The average weight and price of trade in the time interval 1965-2005 (Manufactured goods classified chiefly by material (Code 6)).

As can be easily implied by Figure 1, In terms of the magnitude of trade value, the 'Iron and Steel' (Code 67) and 'Textile yarn, fabrics, made-up articles, n.e.s., and related products' (Code 65) have mostly been in the lead throughout the study period, swapping first place from time to time, although a dramatic jump in Iron and Steel trade value statistics can be detected between the years 2000 and 2005. Codes 69 and 66, respectively referring to 'Manufactures of metals' and 'Non-metallic mineral manufactures' have been tightly following one another in third place for most of the period. Referring to Table 1, trends for trade value for all nine divisions of Section 6 (Code 6) were found to be ascending, a fact also explicitly pointed out by Figure 1. With reference to Figure 1 and of course more precisely, Table 1, seeing that the linear regression model for Code 67 (Iron and Steel) is the steepest, it can be stated that Iron and steel trade value (US$) has been the fastest growing among all commodity divisions in the course of 1965 to 2005. While textile yarn, fabrics and etc. (Code 65) is seen to have gained the second most extreme trade value growth, Non-metallic mineral manufactures (Code 66) and Manufactures of metals (Code 69) – exhibiting about the same growth rate – lie in third place. Meanwhile, Leather and leather manufactures (Code 61) trade has experienced the mildest increase rate in value among other divisions, closely followed by Codes 63 (Cork and wood manufactures) and 62 (Rubber manufactures). According to Figure 1, the trade value growth momentum has slightly eased between 1995 and 2000. Though still on the rise, this transient halt may be attributed to Asia's 1997-1999 financial crisis.

Likewise, in view of Figure 2 and Table 1, dominant trade weight trends may also be recognized. Again, trends for trade weight for all nine divisions of Section 6 (Code 6) were found to be ascending and once more, the steepest slope belongs to the regression line of 'Iron and steel' (Code 67), reflecting fastest growing trade weight for this division amongst all nine commodity divisions. Behind Iron and Steel, this time comes 'Non-metallic mineral manufactures' (Code 66), followed by ' Paper, paperboard and articles of paper pulp, of paper or of paperboard' (Code 64). Leather, leather manufactures and etc. (Code 61) is observed to have the slowest growth in trade weight, while 'Rubber manufactures' (Code 62) can be placed second. In terms of trade weight magnitude, for the most of the study period, 'Iron and steel' (Code 67) owns first position and is followed by 'Non-metallic mineral manufactures' (Code 66). Plus, codes 61 & 62, respectively, have had the lowest trade by weight in 'Section 6'. Figure 3 signifies an overall upward trend in both trade value and weight for the 'Manufactured goods' section (Code 6) when a cumulative approach is applied (all divisions summed up for a specific year). Low growth rates in the early stages of study have jumped dramatically from the beginning of the 90's. Trade value (US$) has clearly increased more vigorously compared to trade weight (kg), a possible indicative of global inflation in trade of manufactured goods costs.

Obtained regression coefficients of determination are satisfactory and models for both trade value and weight are considered reliable. As the last row of Table 1 highlights, models describing trade value trends are proved to be slightly more reliable than the weight models, which in turn may reflect the superiority of the meticulous and comprehensive data collection method carried out for trade value data extraction versus the selective and representative approach deployed for trade weight information. Nevertheless, both models appear to be efficient in explaining trade trend.

Division	Detail	Value of Trade		Weight of Trade	
		Linear Regression Models (US$)	R^2	Linear Regression Models (Kilograms)	R^2
61	Leather, leather manufactures	v = 4E+08t - 8E+11	0.8572	w = 3E+07t - 6E+10	0.8248
62	Rubber manufactures	v = 1E+09 t - 2E+12	0.7558	w = 2E+08 t - 4E+11	0.7113
63	Cork and wood manufactures	v = 7E+08 t - 1E+12	0.8079	w = 6E+08 t - 1E+12	0.6852
64	Paper & paper articles	v = 2E+09 t - 4E+12	0.8307	w = 1E+09 t - 3E+12	0.7387
65	Textile yarn, fabric and etc.	v = 4E+09 t - 7E+12	0.8432	w = 6E+08 t - 1E+12	0.8244
66	Non-metallic mineral manufactures	v = 3E+09 t - 6E+12	0.7509	w = 3E+09 t - 6E+12	0.6017
67	Iron and steel	v = 5E+09 t - 9E+12	0.7037	w = 4E+09 t - 7E+12	0.7972
68	Non-ferrous metals	v = 3E+09 t - 5E+12	0.7521	w = 8E+08 t - 2E+12	0.7656
69	Manufactures of metals	v = 3E+09 t - 6E+12	0.7539	w = 1E+09 t - 2E+12	0.7709
Code 6	***Manufactured goods***	**v = 2E+10 t - 4E+13**	**0.78**	**w = 1E+10 t - 2E+13**	**0.7713**

Table 1: Linear Regression Models for 125 countries during 1965-2005 (Code 6: Manufactured Goods)

Conclusion

Trade trends of 'Manufactured Goods Classified Chiefly By Material', demonstrated by code No.6 in the Standard International Trade Classification, SITC, throughout Asia, Europe and Africa (AEA region), both in terms of trade value & weight, respectively in US dollar & kilograms were studied. Trade data, including trade price & trade weight were derived from UN Comtrade database for 125 countries in the AEA region spanning a time period of 40 years between 1965 and 2005. Data was extracted in 5 year intervals resulting in 9 sets of information. The SITC classification system subdivides manufactured goods into 9 initial subdivisions. Overall, a total number of 2531250 trade data were collected & used in the analysis. Value & weight figures were then plotted against time & linear regression revealed trade trends of the mentioned tributary commodities. Moreover, the subdivisions with the sharpest & lightest rising trends in value & weight were identified. This study is among the few to address commodity trade weight as a distinguished parameter & its combined study with trade value.

Results are depicted in in Figures No.1, 2 and Table No. 1. Figure 1, pertaining to trade weight, points out an ever-upward trend in trade value since 1965 for all commodity divisions. With the start of the 1990's, trade value (US$) figures for all nine divisions have significantly risen in the AEA region, compared to a fairly steady increase rate during 1965 to 1990. In terms of the magnitude of trade value, the 'Iron and Steel' (Code 67) and 'Textile yarn, fabrics & etc.'(Code 65) have mostly been in the lead throughout the study period, although a dramatic jump in Iron and Steel trade value statistics can be detected between 2000 and 2005. Iron and steel trade value (US$) was found to own the fastest

growing among all commodity divisions in the course of 1965 to 2005, followed by 'Textile yarn & fabrics.

Figure 2 reveals prevailing trade trends in terms of weight(Kg). Again, trends for trade weight for all nine divisions of Section 6 (Code 6) were found to be ascending and once more, 'Iron and steel' (Code 67) is shown to be the fastest growing trade item by weight, where 'Non-metallic mineral manufactures' (Code 66), & ' Paper, paperboard & etc.(Code 64) come second and third. In terms of trade weight magnitude, for the most of the study period, 'Iron and steel' (Code 67) owns first position and is followed by 'Non-metallic mineral manufactures' (Code 66).

Trade value (US$) has clearly increased more vigorously compared to trade weight (kg), a possible indicative of global inflation in trade of manufactured goods costs. This fact seems to have its roots in significant population growth rates across Asia & Africa and technological improvements leading to lower trade and transportation costs. Moreover, the presence of items such as 'Iron and Steel'(Code 67), 'Manufactures of metals'(Code69) – together covering a very broad range of iron, steel and metal based manufactures – and indeed 'Non-metallic mineral manufactures' (Code 66) – including Lime, cement, and fabricated construction materials - have added strategic importance to SITC Section 6. All products mentioned above are central to economic development and countries in the AEA region, most of which being categorized under "developing states", are in urgent need of them to continue developing their infrastructure and economy. This growing demand is well confirmed & illustrated by means of this study.

Obtained regression coefficients of determination are satisfactory and regression models for both trade value and weight are considered to be reliable. As the last row of Table 1 highlights, models describing trade value trends are proved to be slightly more reliable than the weight models, which in turn may reflect the superiority of the comprehensive data collection procedure carried out for trade value data extraction versus the selective and representative approach deployed for trade weight data extraction. Nevertheless, both models appear to be efficient in explaining and thus, predicting trade trends.

Acknowledgement
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THE IMPACT OF RISK MITIGATION ON LOGISTICS SERVICE FROM THAI SHIPPER'S PERSPECTIVE

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Abstract
This research aims to analyze the impact of risk mitigation on logistics service. Risk, in general, is one of the critical pillars in business performance evaluation and is usually found in management related discipline. However, only a hand full of published research investigates on risk mitigation in the logistics service content. Therefore, this study focuses on the analysis of the impact of risk mitigation on logistics service. The main purpose of this study is to identify the dimensions of the risk mitigation and its impacts on logistics service, which consists of logistics service value, trust, customers' satisfaction and customer loyalty. This paper is aimed to propose a research framework based on the literature review and interviews. The output of the research framework is driven to assist risk mitigation strategy for Thai shippers and to identify the main impact factors related to risk mitigation on logistics service. Moreover, the theoretical model, developed from the research framework, can be used as a guideline in forming business strategies.

Keywords: Risk Mitigation, Logistics Service Value, Trust, Customer Satisfaction, Customer Loyalty, Structural Equation Modeling

Introduction

According to Department of Trade Negotiations (2012), the understanding of logistics in businesses are still lacking among business practitioner. The information from the World Bank (2013) stated that Logistics Performance Index (LPI), which is used to measure logistic performance, of Thailand is still hindering behind Malaysia and Singapore (Table 1). The information from ASEAN SME Regional Gateway (2013) stated that comparing the data to LPI World with countries in the region, we can see that Thailand is lagging behind and still need to develop in the area of logistic service. When comparing logistics performance between Thailand and other ASEAN states, Thailand out-performs Philippine, Vietnam and Indonesia except for Singapore and Malaysia. Thailand may have the advantage of financing opportunities, larger product markets and cost competiveness. However, as stated by Manuj and Mentzer (2008), these may come with high level of risk. A considerable body of literature of risks and uncertainties has been revealed that there is a high relationship in between global supply chains and risk management and that most companies has developed plans to protect against them (Chopra and Sodhi, 2004; Christopher and Lee, 2004; Manuj and Mentzer, 2008). As to today's increasingly dynamic business environment, risk mitigation can be seen as a conceptual proof in gaining financial opportunity and competitive advantage. In the researchers' point of view, in order to improve the logistics score index, logistic are to be firstly identified and analyzed. Secondly, under the context of logistic, risk results from the uncertainty of future events are to be examined in relation to its impact to business performance (Wirthschaftslexikon, 2004). Therefore, this research is aimed to create a model for Risk Mitigation on Logistics Service. Moreover, a research model is proposed to improve the organization strategy through understanding of risk mitigation in logistics service.

Table 1 : Logistic Performance Index

Factor / Countries	Custom	Infrastructure	International shipment	Logistics quality and competence	Tracking and tracing	LPI
Singapore	2	4	1	6	6	14
Malaysia	36	28	13	31	41	37
Thailand	39	36	30	39	37	48
Philippine	54	64	20	47	44	42
Vietnam	53	66	58	51	55	76
Indonesia	72	69	80	92	80	69

Table 1: Logistic Performance Index (LPI) of Southeast Asia countries in 2010 based on selected factors.

Risk Mitigation
There is a wide source of literature on risk and uncertainties in logistics. Risk is commonly identified as a combination of the chance of a particular event with the impact that the event would cause if it occurred. Therefore, risk is an expected outcome of an uncertain event (Manuj and Mentzer, 2008). In order to deal with the risks and achieve operational goal, it is important to manage and mitigate the risk. Miller (1992) mentioned that there are four general strategy for risk mitigations which is importance for adapting to the context of the supply chain including, avoidance, control, co-operative and flexibility.

Moreover, Sheffi (2002) has concluded that risk mitigation in supply chain can inhibit the negotiation from the customer, which will increase the value of the service and cause an overlapping when comparing to the efficiency. For example, a conflict between overcapacity in the supply chain and elimination or reduction of loss will lead to an impact to value of the service. Therefore, it can be hypothesized that Risk Mitigation has a positive effect on the Value of Logistics Services (H1). Povey (1999) stated that the concept of risk behaviors tend to be formed by predisposition and may occur from the decision depending on situations that affect trust. Thus, a second hypothesis (H2) hypothesized that Risk Mitigations have a positively influences on Trust in between shippers and service providers.

Logistic Service Value
Logistic Service Value is the convergence of the necessity of customer service when providing value and the profit for partners. Mentzer et al. (1997) stated that Logistic Service Value is an important component of logistic service which allows companies to obtain advantage in a competitive market. Kent and Flint (1997) mentioned that value created in logistics, for example, transport reliability, is one of the key advantages of a company in order to gain customer satisfaction. Sweeney and Soutar (2001), and Wang et al. (2004) mentioned that the other than monetary factors, Logistics Service Value are to be justified in order to meet the needs of both the service providers and shippers. LaLonde and Zinszer (1976) stated that the important elements from customer service, which can increase logistic value, must meet the needs of customers and the results of operations measures to the satisfaction of the client itself. Therefore, in this paper, the researcher hypothesized (H3) Logistic Service value that have a positively influences on Customer Satisfaction.

Trust
Morgan and Hunt (1994) mentioned that trust is gained when members in a group of people have reliability in the good moral and responsible for each other. Rousseau,et al. (1998) and Singh and Sirdeshmukh (2000) stated that trust in a business environment is seen as one of the most important variables in creating a positive relationships. A wide body of literature endeavor that trust is the key factor for building a long-term relationship (Moberg, et al. 2002; Lambert, et al. 1996).

Trust can be seen as the point of constancy and cooperation which is directly correlated with trustworthy and satisfaction (Morgan and Hunt, 1994). Similar to studies conducted by Christou (2010) and Yuksel, et al. (2008), the relationship between trustworthy and satisfaction in hospitality services concluded similar results to Morgan and Hunt (1994). Chiou and Pan (2009) have found that trust has a direct influence to customer satisfaction. This suggested that the trust is created by many different ways and these will lead to a great impact on the quality of business experience. Thus, in this research hypothesized that (H4) there is a positive correlation between trustworthy and customer satisfaction. Furthermore, as trust is considered as a foundation for customer loyalty (Moorman, et al. 1993), it can be hypothesized that (H5), trust will have a direct influence to Customer Loyalty.

Customer Satisfaction
Customer Satisfaction is defined as an evaluation of the product or service by the customer of whether or not it meets the customers' requirement. Kotler and Armstrong (1996) stated that Customer Satisfaction is foundation in marketing, along with consumer research, psychology and economics. Customer Satisfaction is driven by feelings, which is the result from expected valuating including the decision to purchase, owning and demanding associated with the purchase (Boeselie et al, 2002). Anderson and Sullivan (1993), Bolton and Drew (1991) and Fornell (1992) mentioned that the Customer Satisfaction can be seen as an influential result of Risk Mitigation on Logistics Services for shippers. Based on these research claims, this research hypothesized (H6) that Customer Satisfaction have a positively influences Customer Loyalty.

Customer Loyalty

Pearson (1996) claimed that loyalty of customer are inherited from the attitude of customer combined with behavioral from attitude customer which may generate an intention to purchase goods for many times or purchase that goods from the same company or recommendation for that goods to other company. Customer Loyalty initiates from the first contact between the shippers and service providers throughout the duration of the relationship. The ability to attract and retain customers is not only the product or services, which customers expect, but also giving them more than their expectations will Customer Loyalty to the firm. According to Wallenburg (2009), maintaining an existing customer and continuing business with them is far less expensive than finding a new customer which leads to a greater profitability. From the literature review, along with the stated hypothesis (Table 2), this paper proposed a model (Figure 1) which consists of Risk Mitigation on logistics service that affects Logistics Service Value, Trust, Customer Satisfaction and Customer Loyalty.

Table 2 : Research Hypotheses
H1: Risk mitigations have a positively influences Logistic Service value
H2: Risk mitigations have a positively influences trust
H3: Logistic Service value have a positively influences Customer Satisfaction
H4: Trust have a positively influences Customer Satisfaction
H5: Trust have a positively influences Customer Loyalty
H6: Customer Satisfaction have a positively influences Customer Loyalty

Table 2: Research hypotheses is created based on research model and designed to examine the causal effects of each factors

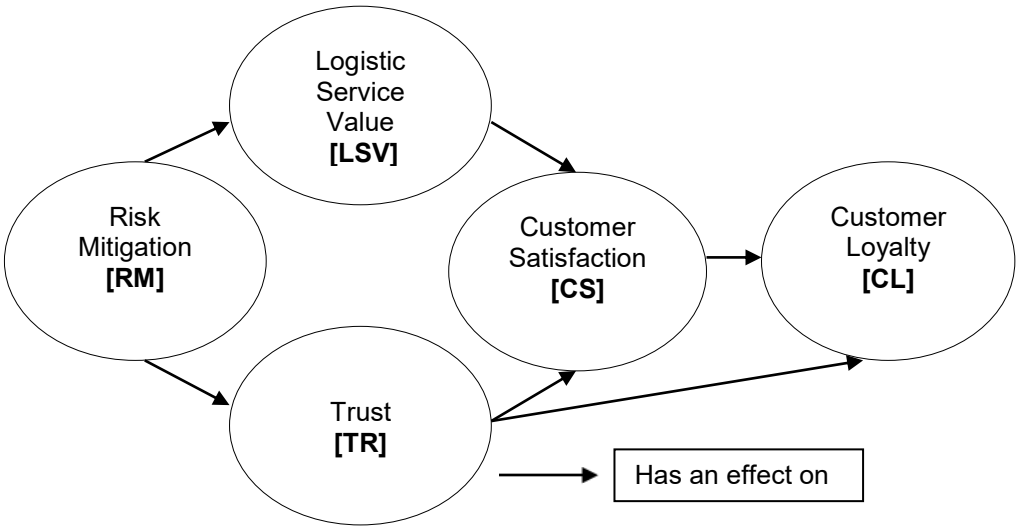

Figure 1: Proposed Model

Methodology

This study uses a questionnaire survey to collect the empirical data. The questionnaire was separated in to two sections. The first section are five-likert-scale subjective questions in measuring the level of satisfaction of each factors used in this study namely; RM, LSV, TR, CL, CS And respondents from Thai Shipper's Perspective in Thailand. The information will be gathered via online questionnaire. The factors in the questionnaire will be compiled from literature review and tested the validity by using Independent T-Test. Then, the researchers will use non-response bias to test if the answers of respondents differ from the potential answers of those who did not answer. The questionnaire web-link, along with a digital cover letter will be sent via E-mail to at least 2500 potential respondents.

Response Rate and Nonresponse Bias

In most survey-based research, the level of response rate generally affects the quality of research findings and level of generalizability (Maylor and Blackmon, 2005). A low response rate may reflect

participant's dislike of filling out the surveys or suggest problems with the questionnaire (Bryman and Bell, 2007). The pilot test was carried out to examine the feasibility of the completed questionnaire under actual conditions of data collection. This process is critical in observing potential error or ambiguities in wording, sequencing, layout and clarity. All research hypotheses are intended to be analyzed via SPSS and AMOS software packages version 21 with varimax rotation (Chao, 2011).

After data collection, the researcher must prepare the data to be analyzed. Organizing the data correctly can save a lot of time and prevent mistakes. Most researchers choose to use a database or statistical analysis program (SPSS) that they can format to fit their needs in order to organize their data effectively and to avoid non-response biases. The consequences of non-response can vary. As non-response increases, the potential for a biased sample increase. This would cause the data obtained from a large population to be invalid. In short, response bias can assist in validating the probability sample collected from potential respondents.

Reliability Test and Validity Test

Reliability is defined as the similarity of results provided by independent but comparable measures of the same object, trait, or construct (Chao, 2011). On the other hand, Churchill (1976) stated that validity is defined as the extent to which differences in scores on it reflect true differences among individuals on the characteristics we seek to measure, rather than constant or random errors. Instruments of reliability and validity are main part in quantitative research and it can prevent unstable and unreliable measures which may lead to obtrusive outcomes of the real world. It is important of Structural Equation Models (SEM) to only on the models with an overall fit and validity. After assessing the data for multivariate assumptions the fitness of each individual latent factor was evaluated using confirmatory factor Analysis (CFA). To detect miss specification in the hypothesis model, standard goodness-of-fit indices were used in order to assess the output of the measurement model. According to Hair et al.,(2010) , the χ^2 value and the associated degree of freedom with a ratio of 3:1 is to check the overall model fit and Unidimensionality. Divided by Absolute Fit Index (χ^2 /df< 3.0) is recommended, with at least one absolute fit index and one incremental fit index. In this study, a combination of absolute fit indices are proposed (χ^2 /df ,GFI, RMSEA) , along with CFI and TLI as the increment fit index (Min and Mentzer ,2004). Thus, in this section, a proposed measurement model of validity is illustrated in Table 3.

Measurement Model of Validity		
Validity	**Criteria**	
Overall Model Fit/ Unidimensionality	***Absolute Fit Index***	χ^2/df < 3.0
		GFI > 0.8
		RMSEA < 0.08
	Increment fit index	CFI > 0.9
		TLI >0.9
Validity / Reliability	***Convergent Validity***	CR > 0.7
		AVE > 0.5
	Scale Reliability	Cronbach's α > 0.7

Table 3 : Measurement Model of Validity (Chao and Anantana, 2014)

Scale reliability may help clarify whether dimensional and non-dimensional variants of disorders constitute the same disorder as well as whether dimensional affects treatment outcome and prognosis. The central limit theorem states that the sampling distribution of any statistic will be normal or nearly normal, if the sample size is large enough (Chao and Anantana, 2014).

Structural Equation Modeling (SEM)

SEM uses standardized coefficients to indicate the relative strength of the statistical relationship. Through loadings from the instrument items to the construct, similar interpretation of the result can be utilized. In contrast to regression, SEM allows multiple variables to be observed when dealing with the development of more sophisticated theories. SEM involves with greater recognition given to the validity and reliability of observed scores from measurement instruments (Schumacher and Lomax, 2004). According to Hair, et al. (2010), SEM is considered as one of the most appropriate multivariate analytical technique, which allows researchers to estimate multiple and interrelated dependence relationships also to handle large number of endogenous and exogenous variables, as well as latent (unobserved) variables as linear combination (weighted averages) of the observed variables (Golob, 2003).

Other than SEM, another widely utilized analytical method can also be applied in analyzing the stated relationships in this paper. In (Table 4), both PLS (Partial Least Squares) and SEM are capable of examining multiple relationships in one single structural model which are response-based and provides overall model fitness. However, when examining a complicated model with interrelated relationships between multiple observed and latent variables in a confirmatory research approach, SEM is more suitable than PLS. While PLS shares similar characteristics with SEM, PLS approach is exploratory-driven rather than confirmatory-driven. Thus, with the examination of interrelated causal relationship between RM , LSV ,TR ,CS and CL, the use of SEM is strongly recommended as the most effective analytical instrument (Chao, 2011; Byrne, 2001; Hair, et al. 2010 and Chin, 1998).

Comparison in between PLS and SEM		
Criterion	**PLS**	**SEM**
Objective	Prediction orientated	Parameter orientated
Analysis approach	Variance based SEM	Covariance-based SEM
Distributional assumptions	Non-parametric	Multivariate normal distribution for maximum likelihood
Required sample size	Low (min 30-100)	High (min 200-800)
Required theory base	Does not necessarily require sound theory base. Supports both exploratory and confirmatory research.	Requires sound theory base. Supports confirmatory research.
Parameter estimates	Consistency at large	Consistent, given correctness and appropriateness
Indicators per construct	One or more	Can be as few as one if indicator's error is constrained
Constructs per indicator	Indicators can only relate to one construct	Indicators can related to one or more construct
Correlation between constructs cab be estimated as undirected ?	No	Yes
Correlation between measurement errors can be modeled ?	No	Yes
Statistical test for estimates	Inference requires jackknifing or bootstrapping	Available and valid given model assumptions are tenable: inference by bootstrapping otherwise
Goodness of-fit measures	Yes ,but limited global measures	Yes
Epistemic relationship between latent variables and measures	Formative and reflective indicators	Typically only with reflective indicators
Examines interaction effect on the entire model	Not readily supported	Supported
Can constrain a path to a given value	Not supported	Supported

Table 4: Comparison Between PLS and SEM (Chao, 2011)

Discussion

In discussion, this paper attempts to propose a systematic model of the impact of Risk Mitigation on Logistics Service. Through the literature review, a conceptual model was presented with guidance to allow it to be measured quantitatively. The proposed contribution of this paper can be presented in three ways. Firstly, the benefit is entrepreneur will know the level of importance of the Risk Mitigation and the impact that related to Mitigation on Logistics Service. In addition, it is able to help entrepreneur to have knowledge of Mitigation on Logistics Service. Moreover, the entrepreneur will know about the attitude of the exporter in Thailand toward using Logistics Service. Lastly, they can improve how to solve problems and create strategies to enhance the satisfaction of customers. Furthermore, the company can use the models to create the strategies of Risk Mitigation on Logistics Service and to make the benefits for the organization. It will be useful, if the organization try to use strategies in the process of service. In addition, it can decrease the risk and help the entrepreneur to know the importance of mitigations on Logistics Service.

Limitations

This paper focuses on research framework, where actual data collection will commence after the completion of this paper. This paper goes through a systematic method of creating a research framework which covers ground of model validity and data reliability. The main analysis of this paper uses quantitative data collected via questionnaire. Therefore, the number of questionnaire will determine the level of validity and reliability of the result. Nevertheless, the output of this research will

allow practitioners a better understanding of the importance of Risk Mitigation and its impact on business performances.

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THE USE OF MATERIAL FLOW COST ACCOUNTING TECHNIQUE TO REDUCE LOSSES WITHIN THE WOODEN FURNITURE PRODUCTION PROCESS

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Abstract
This study looked at how to reduce production losses using Material Flow Cost Accounting (MFCA), an environmental impact assessment technique used to help enhance productivity, and improve environmental management. MFCA focuses on both the costs of products and the costs associated with materials losses, and its ultimate purpose is to identify opportunities for reducing materials usage and losses, improve the efficiency of materials and energy usage, and reduce adverse environmental impacts. The research was carried out at a furniture factory in the north of Thailand, where problems such as high costs and residual wood waste have been experienced in recent years. Therefore, this research study aimed to analyse, classify and identify the losses incurred during the case study company's production process, and then develop and propose guidelines for improvement. The MFCA concept was employed to analyse resource use inefficiencies within the production process, as well as the causes of these inefficiencies. An estimate of the losses incurred in terms of costs was produced using the MFCA. Material loss data in terms of material costs, system costs, energy costs, and waste management costs obtained during the MFCA analysis were then summarized and prioritized using Pareto diagram. The results of the analysis helped identify ways to improve the design of the process and the product. Suggested solutions were developed and then put into practice, with the amount of wood and chemicals used during the process reduced as a result. Moreover, the standard working procedures used during each process step were redesigned. The results showed that MFCA helped total input costs for the production of the night table decrease by 19.55%, with negative product costs falling from 38.54% of input costs to 27.2% of input costs. In summary, this case study found ways to adapt the wooden furniture production process in the study factory, so as to reduce both losses and the adverse environmental impacts of the process.

Keywords: Wooden Furniture, Material Flow Cost Accounting

Introduction

Currently, interior design and furniture manufacturing businesses are very popular in northern Thailand due to the increase in housing and condominium developments in the country. Within this sector there is a lot of cost competition among companies, and also a need to produce environmentally – friendly products. This research was carried out at a furniture factory in the north of Thailand. The company's competitors are local small-scale manufacturers, as well as traders who could gain advantages through effective cost administration, and materials and waste management processes. This case study looked at the production problems experienced during the wooden furniture manufacturing process at the case study company, focusing on the creation of wood waste through the duplication of tasks caused by non-standard work, resulting in wood materials and painted furniture losses.

This research used Material Flow Cost Accounting (MFCA) technique as a tool to carry out an environmental impact assessment, to help illustrate the changes in value of the materials transfer process, and to help classify and identify losses incurred during the production process (ISO, 2011). This MFCA method was used to assess the losses incurred by classifying the materials, labour, energy and waste management costs into positive costs, and those costs incurring losses, or negative costs (Nakajima, 2006). MFCA focuses on both the costs of products and the costs associated with materials losses, and its ultimate purpose is to identify opportunities for reducing materials usage and losses, improve the efficiency of materials and energy usage, and reduce adverse environmental impacts (ISO, 2011; Nakajima, 2006). MFCA technique can be used in all industries, such as the production of souvenir music boxes (Chompu-inwai *et al.,* 2013), a small industry sector in Thailand. In Chompu-inwai *et al.* (2013), after using MFCA technique to analyse the materials flows during the wood cutting process, the causes of losses could be identified and the suggested solutions based on various engineering techniques were then developed. MFCA can also be used to make productivity improvements; as a tool for managers to work in real-time (real time monitoring) on abnormal losses

occurring during production runs, or used alongside ERP systems in large industrial processes to minimize losses (Fakoya and Margaretha van der Poll, 2013).

Therefore, this research study aimed to analyse, classify and identify the losses incurred during the case study company's production process, and then develop and propose guidelines for improvement. The MFCA concept was employed to analyse resource use inefficiencies within the production process, as well as the causes of these inefficiencies (Nakajima, 2010).

Research Methodology and Results

The study focused on production of the basic night table model at the case study company, which is made of teak and teak plywood and is a proprietary format at the case study factory. The data collected in this study was related to the production of one basic night table, as shown in Figure 1.

Figure 1: Night Table - Basic Model

There are four major of tasks within the night table production process: woodworking, painting, assembly and packing. Therefore, the data analysis performed by MFCA defined each job as a quantity center (QC). A brief explanation of the production process is as follows:

- A hardwood frame is made and then a veneer and pieces of teak added to form a cabinet with a pattern design.
- The painting process includes using an abrasive, then a wood filler and wood stain, before a lacquer coating is added.
- Assembly includes installing fittings such as rails, hinges and handles, to make the cabinet ready to use.
- Packing is the final step. The wood pieces are cleaned and packed in foam (to prevent damage), then also wrapped in paper before being sent to the client.

All four tasks are shown in Figure 2.

Figure 2: Four QCs Used to Make a Night Table

Data Collection

The researchers collected employee and machine use data by department, and this contained information on working times and raw materials used during production of the night table. Data on the materials used were divided into three types: Main materials, Auxiliary materials and Sub-materials, and these were collected from the Stores and Accounting Department. Some of the technical terms used here are: Main materials - means materials used primarily to make the product, Auxiliary materials - means materials that are not a component of the product, and Sub-materials means materials used as components of the product.

Next, a Material Flow Model for the night table was constructed according to the QC configuration. This flow chart showing details of the input materials, output products and waste is shown Figure 3, which describes the use of all three types of materials; Main materials, Auxiliary materials and Sub-materials, dividing them into the four QCs. It was found that weight loss occurred among the raw materials, and that waste was very common for the plywood and teak wood activities. Losses were also found to take place as a result of the lacquer paint work.

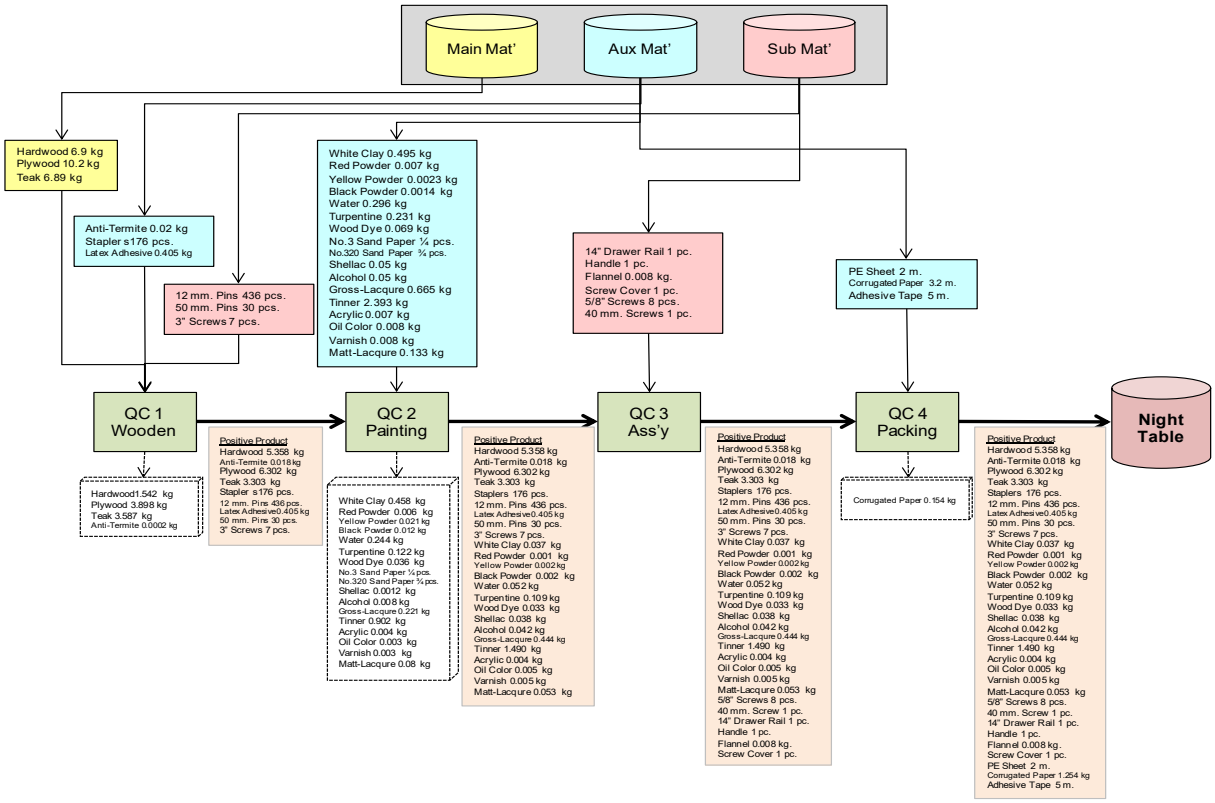


Figure 3: Material Flow Model

MFCA Calculation

MFCA technique was used to assess losses across all four categories, including; materials costs, system costs, energy costs and waste management costs. For materials costs, a Material Balance Table was created for each of the four QCs used in the production of one night table. Table 1 shows Materials Balance Tables for QC 1 (woodworking), which compares the physical inputs and outputs in this quantity center. It can be seen that 24.51 kilograms of materials entered this quantity center, while the amount of materials leaving the quantity center was: 15.48 kilograms or 63.16% as products, and 9.03 kilograms or 36.84% as waste.

In order to convert products and materials losses into monetary units, the total materials costs for each QC were calculated by multiplying the physical amount of each material by a unit cost, resulting in 729.01 Thai Baht's worth of materials losses (negative product) and 1,023.27 Thai Baht's worth of product costs (positive product).

The Materials Balance Tables for QCs 2, 3 and 4, set out in a similar way to QC 1, show the proportions of negative product (by mass) as 48.25%, 0.00% and 10.12% respectively.

Materials Balance Table – QC 1 Woodworking							
Materials Purchased		**Inputs**		**Waste**		**Output**	
Materials Inputs	**Cost/kg**	**Quantity**	**Cost**	**Quantity**	**Cost**	**Quantity**	**Cost**
45 mm. Hardwood	16.96	6.900	117.00	1.542	26.15	5.358	90.85
Anti-Termite	110.00	0.020	2.20	0.002	0.22	0.018	1.98
Stapler	276.92	0.023	6.34	0.000	-	0.023	6.34
6 mm. Plywood	88.24	10.200	900.00	3.898	343.94	6.302	556.06
12 mm. Screws	563.33	0.013	7.37	0.000	-	0.013	7.37
Latex Adhesive	27.20	0.405	11.02	0.000	-	0.405	11.02
50 mm. Screws	550.00	0.024	13.20	0.000	-	0.024	13.20
Teak	100.00	6.890	689.00	3.587	358.70	3.303	330.30
3 inch. Screws	176.00	0.035	6.16	0.000	-	0.035	6.16
Total		**24.51**	**1,752.28**	**9.03**	**729.01**	**15.48**	**1,023.27**
Quantity Percentage		100.00%		36.84%		63.16%	
Unit	THB	kg	THB	kg	THB	kg	THB

Table 1: Materials Balance Table for QC 1 (Woodworking)

Table 2 shows an example of the MFCA method used to allocate costs to the positive and negative categories for systems costs and energy costs. In QC 1, 36.84% of the materials inputs were turned into negative product (by mass). In this QC, there were the systems costs of 232.54 Thai Baht, energy costs of 41.29 Thai Baht, and waste management costs of zero. Based on the mass-based materials distribution percentage between positive product and negative product, this meant 85.66 Thai Baht of systems costs and 15.21 Thai Baht of energy costs were then allocated to the negative cost for this QC. Total waste management costs were assigned to materials losses, as these costs are incurred only through materials losses (ISO, 2011). As a result, total negative costs for QC 1 were 829.88 Thai Baht. A similar approach was used to calculate and allocate costs for the other QCs. The positive materials costs, systems costs and energy costs for QC 1 were then used as previous costs for the cost evaluation for QC 2. The total materials, energy and systems costs (before allocation) for QC 2 were the costs of inputs from previous QC (QC 1), plus any new inputs in QC 2.

QC 1 Negative Product Mass = 36.84%	**MFCA Cost Evaluation for QC 1: Woodworking**				
	Materials Costs	**Systems Costs**	**Energy Costs**	**Waste Management Costs**	**Total**
	THB	**THB**	**THB**	**THB**	**THB**
Previous Cost	-	-	-	-	-
New Input	1,752.28	232.54	41.29	-	2,026.11
Total Input	1,752.28	232.54	41.29	-	2,026.11
Positive Cost	1,023.27	146.88	26.08		1,196.23
Negative Cost	729.01	85.66	15.21	-	829.88

Table 2: MFCA Cost Evaluation for QC 1 (Woodworking)

Costs	**Materials Costs**	**Systems Costs**	**Energy Costs**	**Waste Management Costs**
Input Costs	2,429.76	635.35	72.90	-
	77.43%	20.25%	2.32%	0.00%
Positive Costs	1,570.57	324.46	33.74	
	50.05%	10.34%	1.08%	
Negative Costs	859.19	310.89	39.16	-
	27.38%	9.91%	1.25%	0.00%

Table 3: Overall MFCA Cost Matrix (before improvement)

The results of all the cost allocations (including all four QCs) are shown in Table 3.

Table 3 shows the total input costs, with the majority in the negative costs category, with the highest being materials costs at 27.38%, followed by systems costs at 9.91% and energy costs at 1.25%. The total negative costs resulting from the production of one basic night table equalled 38.54%.

Identifying Improvement Requirements

The negative costs data for materials, systems, energy and waste management costs for the four QCs were prioritized using a Pareto diagram, as shown in Figure 4. It shows the top three loss-making activities in terms of costs, representing 80% of total losses. The Pareto diagram shows that negative materials costs for QC 1 (woodworking), negative systems costs for painting (finishing), and negative materials costs for painting at 60.3%, 15.6% and 10.5% respectively.

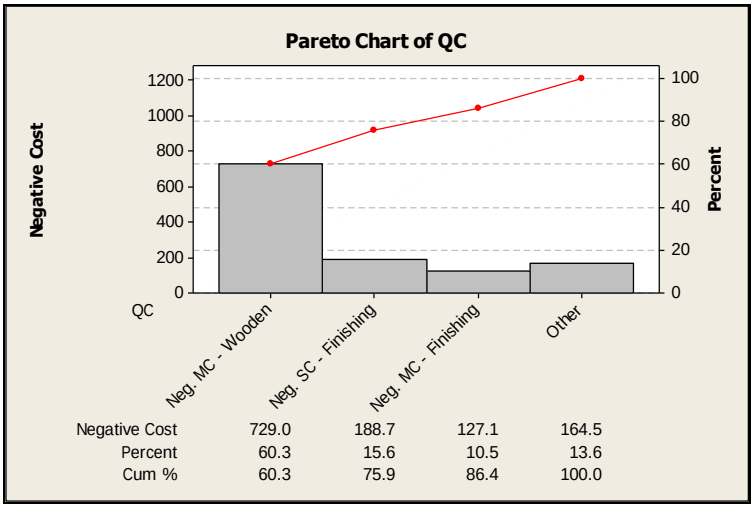


Figure 4: Pareto Diagram of Losses from All QCs

The causes of the negative materials costs in QC 1 were analysed using a Fish-Bone Diagram based on 4M1E (Man, Machine, Method, Material and Environment), as shown in Figure 5.

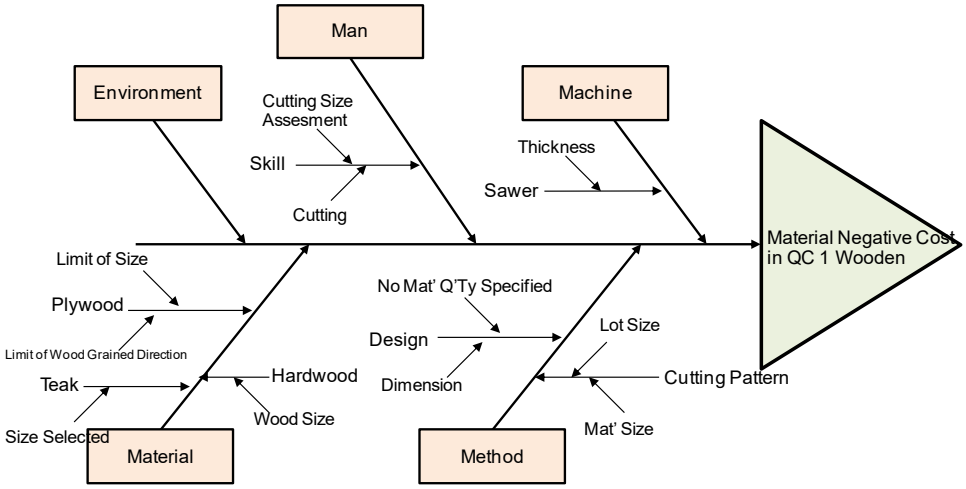


Figure 5: Fish-Bone Diagram for Negative Materials Costs for QC 1 (Woodworking)

Figure 5 presents an analysis of the causes of the negative materials costs found in QC 1 (woodworking), with the most common losses occurring among Plywood and Teak due to the shape of the cabinets, which affected the size of the cuts made for the raw materials, which was limited due to the production plan and the timber selected. In addition, the Fish-Bone Diagram was also used to analyse the causes of the negative systems costs and negative materials costs within the painting QC, finding that the painting process needed to be improved, in particular by producing a standard colour combination, through the provision of skills training for staff, and by refurbishing the working area.

Implementing Improvements

Having analysed losses using the Fish-Bone Diagram, a process for reducing waste was developed based on a previous study (Eshun *et al,* 2012), involving: Reduce, Technology Change, Product Change, Recycle and Reuse steps (Eshun et al, 2012), plus improvements in the design (Nakajima, 2010). Some of these concepts were consistent with the problems found, as follows:

- Re-design the product to reduce wood waste, as shown in Figure 6. The figure shows that the re-designed use of space on the plywood sheet resulted in a higher positive product figure and lower negative product figure for the plywood, which fell by 32.79%, as shown in Figure 7.

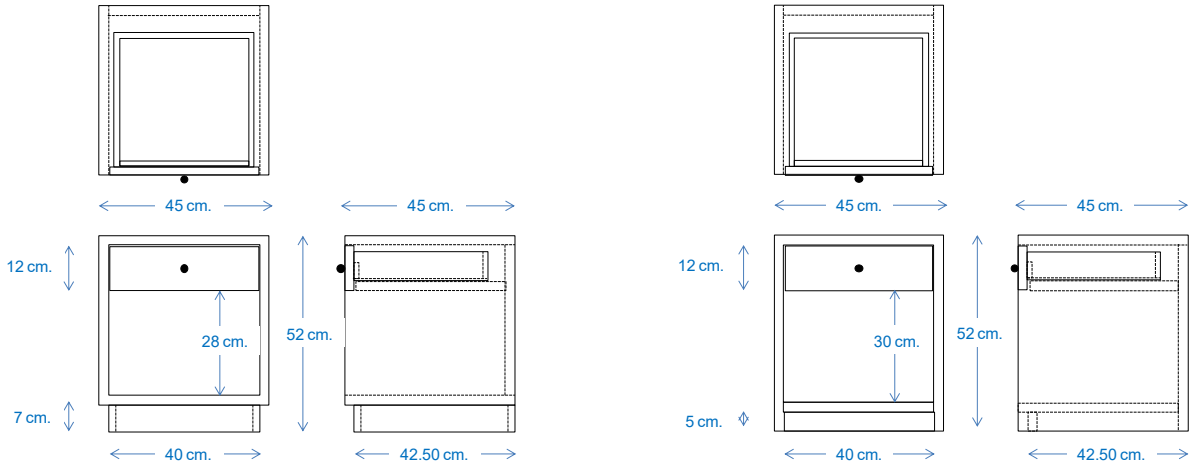


Figure 6: (Left) Night table - Previous Design; (Right) Night table - Improved Design

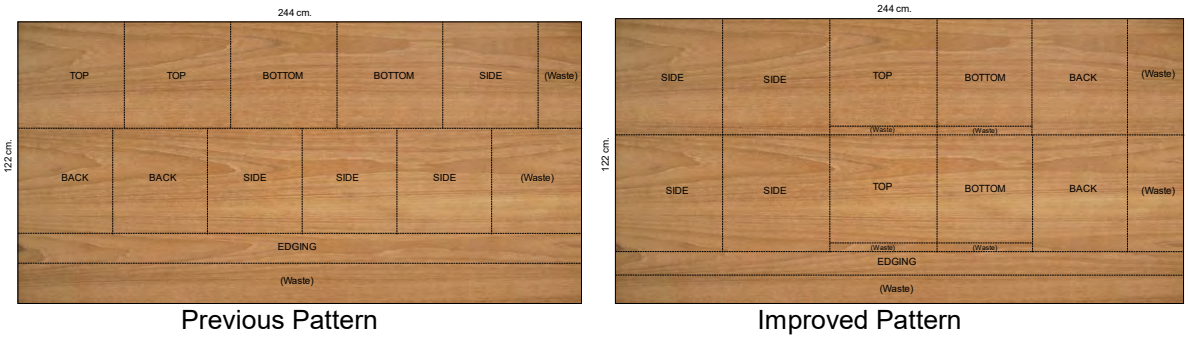


Figure 7: (Left) Plywood Cutting Pattern - Before Improvement;
(Right) Plywood Cutting Pattern - After Improvement

- The new design shown in Figure 6 was found to result in a reduced negative product for Plywood, plus a reduced amount of teakwood used to make the cabinet stand. The functions of the cabinet remained the same, but by applying the new design, the negative product fell by 49.25%.
- The reason why it had been difficult to estimate the number of teakwood chips produced by the cutting process for the drawer, drawer body and legs, was due to the need to select the right wood piece, a task traditionally carried out using random access schemes. This process required care to be taken over the cutting size for each piece, in order to fit the thickness and length of each wood piece. Table 4, shows the results of the drawer body wood selection process, before and after the cutting improvements were introduced. Improvements in the design and selection process led to negative product decreases of 65.29% by mass.
- The problem of negative systems costs within the painting process was found to be due to a lack of standards, leading to duplicated work and rework. As a result, design standards for painting were introduced and a dust- and humidity-free area created to reduce working time

losses. These changes resulted in a reduction in the length of time taken for each painting job by 12.5%.

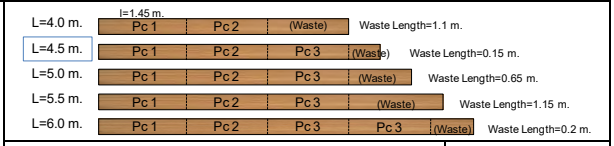
	Before Improved Cutting Teak		After Improved Cutting Teak	
	Length	**Thickness**	**Length**	**Thickness**
Drawer Size	1.40 m.	0.014 m.	1.40 m.	0.012 m.
Teak Selection	- Random selected 4.0 m., 4.5 m., 5.0 m., 5.5 m., 6.0 m. - Cut 1.50 m. length x 1 pc.	0.0254 m. (1.0 inch.)	 -Teak selected 4.50 m. length - Cut 1.45 m. length x 3 pcs.	0.0127 m. (0.5 inch.)

Table 4: Teak Wood Selection Methods for Drawer Parts – Before and After Improvements Introduced

- The lacquer stains problem found within the painting process was caused by non-standard colour combinations being used, and their inappropriate use, leading to excess input demands. This process was improved using an experimental design to find more standard colour combinations. The amount of chemical inputs needed was also determined. This new process resulted in a 49.63% reduction in the amount of chemicals required for each painting process and a negative product cost reduction of 63.02% by mass.

Evaluating Improvements Effects

After improving the night table design, and standardizing the logging and painting processes, a post-improvement evaluation was carried out using an MFCA calculations analysis. The cost calculation results were taken from data collected for one unit of the new basic night table design, as shown in Table 5.

Costs	Materials Costs	Systems Costs	Energy Costs	Waste Management Costs
Input Cost	1,864.56	550.98	109.01	-
	73.86%	21.82%	4.32%	0.00%
Positive Cost	1,422.08	347.46	68.43	
	56.33%	13.76%	2.71%	
Negative Cost	442.48	203.52	40.58	-
	17.53%	8.06%	1.61%	0.00%

Table 5: Overall MFCA Cost Matrix - After Improvements Introduced

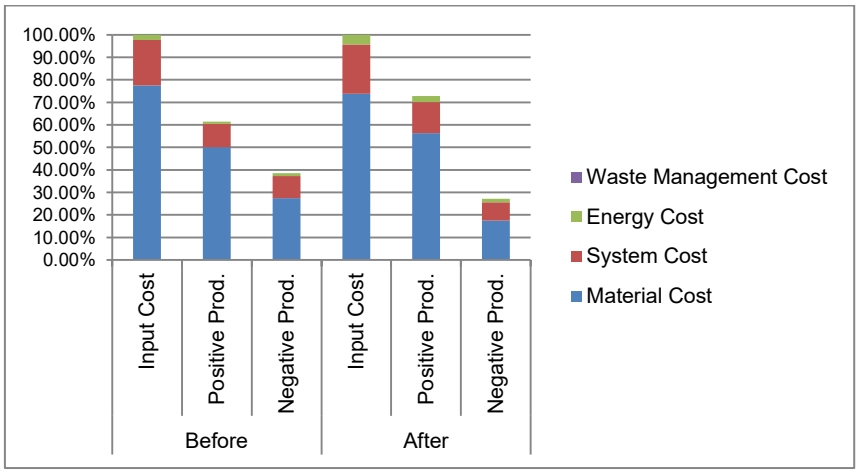


Figure 8: Overview of MFCA Calculation Comparison- Before and After Improvements Introduced (%)

The chart in Figure 8 describes the MFCA calculations prior to making the improvements, showing total negative costs of 38.54% of input costs, and with materials negative product representing 27.38%. The total negative costs, having introduced the improvements, were only 27.20% of the input costs. Meanwhile, the materials negative costs were 17.53% of the total input costs for the night table, a lower percentage than before the improvements were introduced. Prior to the improvements, the input cost value was 3,138.01 Thai Baht per unit, but after the improvements this became 2,524.55 Thai Baht per unit, a decrease of 613.45 Thai Baht or 19.55% per unit. The before-improvements negative costs figure was 1,209.25 Thai Baht per unit, while after the improvements this became 686.58 Thai Baht, a fall of 522.67 Thai Baht, or 43.22%. The negative materials costs before improvements were introduced was 859.19 Thai Baht per unit, but after the improvements was 442.48 Thai Baht, a fall of 416.71 Thai Baht or 48.50%

Conclusion and Discussion

This research study analysed and identified the monetary losses incurred during the study company's production process. Suggested solutions were then developed and put into practice, with the amount of wood and chemicals used during the process reduced as a result. Moreover, the standard working procedures used during each process step were redesigned.

As part of the study, the study company's production process was improved in order to reduce costs and decrease the negative cost that had previously occurred within the production process. After the improvements had been introduced, an assessment was carried out comparing total input costs and negative costs separated into four types, as shown in Figure 8. MFCA techniques were used to improve the night table production process and also bring in a new design (Nakajima, 2010); the aim being to reduce materials losses, and in future, MFCA may be used to further review and improve both product design and process design aspects at the case study company. Such a review will probably have to incorporate all design techniques and strategies, such as Quality Function Deployment (QFD), to create a night table design able to meet the needs of a new generation of customers, and also take into account the raw materials costs incurred by the production process – the best solution for both customers and business owners in a competitive market.

The value of this paper comes from its description of the application of the MFCA approach, and the resulting conclusions as to their effectiveness within an industrial setting.

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ACTION RESEARCH DRIVEN KNOWLEDGE MANAGEMENT IN LOGISTICS TRANSFORMATION

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Introduction

Logistics is defined by the Council of Logistics Management, cited in Vogt et al. (2002, p. 6), as "the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirement." This research involves in particular the supply-side logistics to create winning product value to satisfy customer needs through transforming the farm-to-table operations using knowledge-based information and action-research's co-participative knowledge management strategies. Knowledge-centered organizational learning is necessary, according to Kay (1993), to build core competence that could lead to competitive advantage. A core competence becomes competitive advantage when it is successfully applied in a particular market or markets (Evans et al., 2003). Such a co-participative knowledge management reinforces heavily on valuing the "implicit to explicit" and "explicit to implicit" parts of the knowledge management, as these two processes are generally harder for the competitors to imitate (McEvily and Chakravarthy, 2002). The strengthening of this capability would allow the organizational core competency to not easily be imitated by the competitors, which is further supported by not being transparent to outsiders and not easily transferable even by the resignation of key senior managers.

In other words, logistics in terms of production planning to raw material and work-in-progress logistical movement is a key driving force for successfully implementing the designed business model. This continuous learning enabled knowledge-driven process would also secure durability for competitive advantage. This research discovers that when logistical decision is learning-cum-research enabled and knowledge-driven, the functionality of logistics can help to transform the entire operations of the business and thus to meet desirable operations' key performance indicators in the dimensions of quality, speed, dependability, flexibility and cost (cf. Slack et al., 2010). In note passing, business model can be known simply as a description of how a firm does business which, according to Tan and Sangchan (2014), is an integrative strategic management framework that incorporates the concept of blue ocean strategy (Kim and Mauborgne, 2005), externally oriented industry-attractiveness driven strategy (Porter, 1979) and internally oriented resource-capability driven strategy (Prahalad and Hamel, 1990).

To test how knowledge management serves as a fundamental enabler for inbound and production logistics transformation, both action research cycle and business model cycle will be employed. Knowledge management will be a critical bridge between these two cycles. While the former cycle is driving knowledge creation, the latter cycle is about knowledge utilization. The strikingly explicit benefits of this action research oriented problems solving and change management are multi-faceted. This implies that an intense focus of the problematic issue, driven by the set teams and the team-based active participation and result orientation, can help to pull along other relevant issues to be tackled in parallel. Factors of barriers and supporting mechanisms relating to the use of knowledge creation, knowledge management and knowledge utilization will also be discussed. Most importantly the outcome of knowledge management-enabled logistics transformation in a seafood production facility will be discussed and although it is a single case, but by its rich nature and in-depth action-driven involvement, this research certainly has provided the utility aspect of research quality generally demanded by an applied research.

The research paper is organized in five sections. While the abstract outlines the overall research process and provides a concise summary of the research expectation and outcomes, this introductory section justifies the research background that puts the topic of interest into perspective. In the literature review section a framework will be proposed by intercepting the three disciplines of knowledge, namely action learning and action research, knowledge management and business model, and in addition, research objectives will be raised. Following the literature review is a section focusing on outlining research design which aims to reflect the problematic context and the nature of the firm and its industry, and to identify the procedural structure to address the research objectives, which is followed by discussion and conclusion.

Literature Review

It is worth noted that this literature review is a final iteration along the action research process which signifies that literature structure is shaped by the research process in the context of action research. This also implies the effective working of the cyclical process of the research that involves theory formulation, action taking, data collection and insightful reflection. By activating a higher-level, goal-based double-loop learning approach of the action research, according to Field and Ford (1995), the basis for sustainable competitive advantage can be secured. Within this context, knowledge – a necessary outcome of the learning process – is a factor of production not subjective to depreciation and diminishing returns and thus is a non-consumable resource. As such, knowledge is an appreciating capital asset which emanates wisdom for change and creative innovation, and thus helps to emancipate from outmoded ideologies.

When an organization possesses a capability to apply knowledge and to put knowledge in action, wisdom is claimed to have developed (Bart, 2001). In addition, an organization does not become wise unless individual's wisdom is articulated and transferred to others (Bierly III et al. 2000), and thus to activate an effective knowledge creation process the use of set team is recommended (Taylor, 1994). In addition, a need for knowledge absorption, digestion and applications is recommended (McGill and Beaty, 2002) which suggests the use of action research approach that is conducted through an intense and prolonged contact with a problematic issue of significant importance to the organization. Based on an input-process-output approach in a typical operations management (Slack et al. 2010), knowledge management undertakes knowledge creation as its inputs and knowledge utilization as its output. Knowledge creation can best be activated by an action learning and action research cyclical process (Tan, 2014), while knowledge utilization is best implemented using concept of business model (Tan and Sangchan, 2014). The configuration of their linkages is shown in Figure 1.

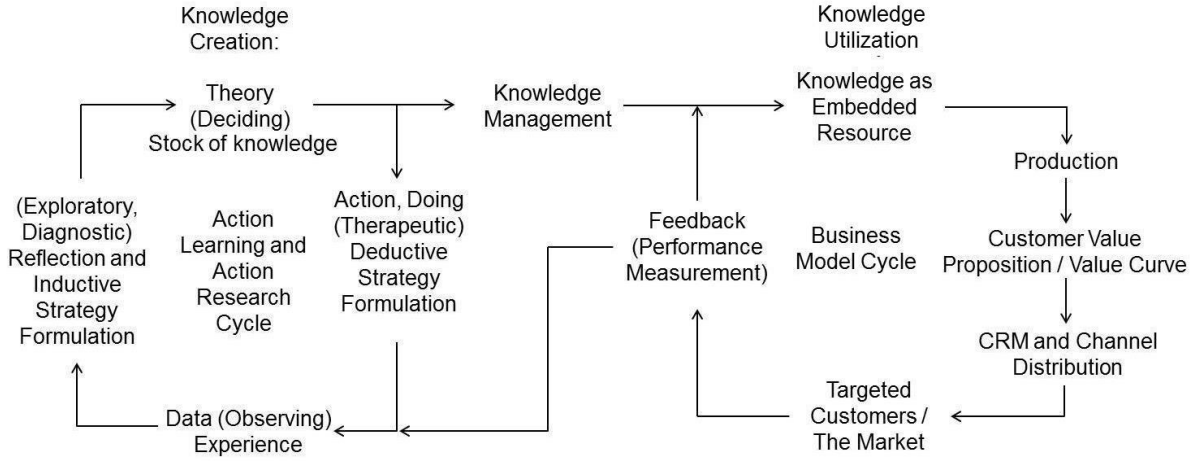

Figure 1: Knowledge Creation, Knowledge Management and Knowledge Utility enabled by Action Learning and Action Research Cycle, and Business Model Cycle (Source: Developed for this research)

The usefulness of using action research framework to drive knowledge creation process is shown in a research conclusion by Gregory (1994), in which action research is employed as the knowledge supporting infrastructure from which individual and collective learning are promoted and where rigorous knowledge can be brought about.

However, knowledge-induced success in an organization depends very much on corporate vision and strategic intents (Hamel and Prahalad, 1989) and corporate strategies and tactics (Mintzberg, 1987), and this is captured by the horizontal aspect of the action-research cycle as shown in Figure 2. Specifically, action research cycle can be interpreted as the superimposition of the horizontal action-reflection activities of action learning (McGill and Beaty, 2002) and the data-theory cycle of induction and deduction in a typical scientific research process (Tan, 2014), which also resembles the experiential learning model of Kolb (1984).

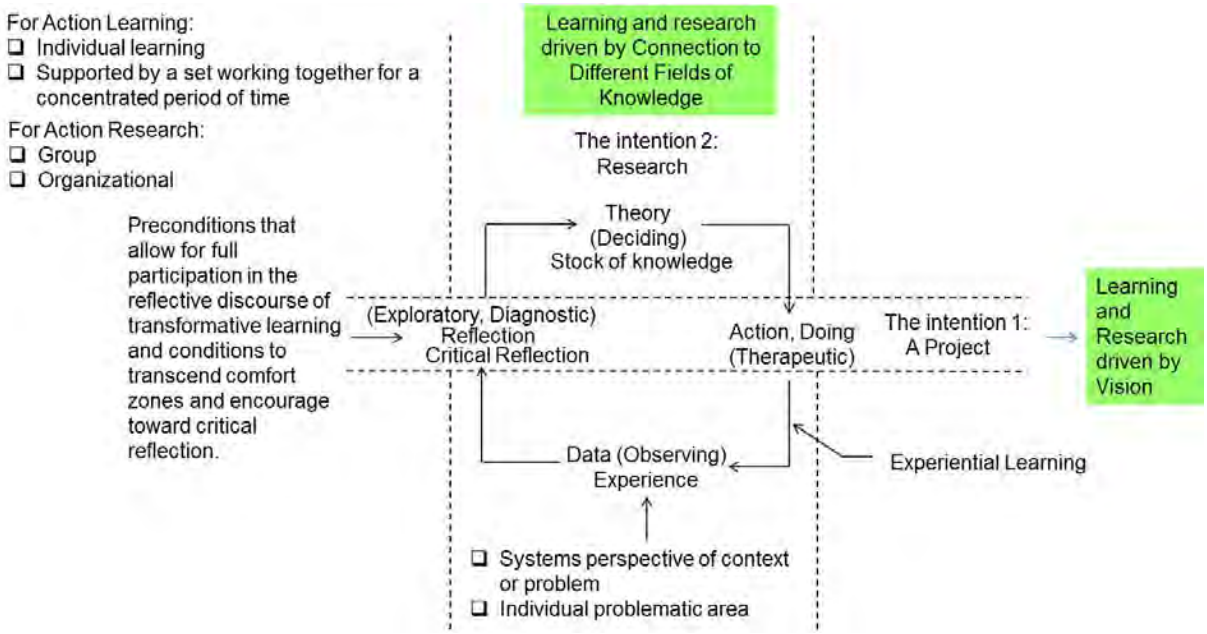

Figure 2: An Action Research Framework

The knowledge creation outcome which is enacted by using a generic action research framework as shown in Figure 2 is then becoming the input to the knowledge management process which typically involves the acquisition, organization and distribution of knowledge (Probs et al., 2002).

Based on the nature of action-oriented research and learning approach to the study of the research phenomenon, the following two objectives are raised:

- What can the set team and the organization critically learn from the proposed action learning-enabled action research methodology and the knowledge management and business model framework? To promote a systematic guideline for action research, the set team members are required to critically reflect upon and examine the enabling and restraining forces at work along the steps of the action research process. In other words, seeing things beyond the normative pattern of knowledge is necessary as it implies gaining the skills of inductive research and deductive research. In addition, the set team members are also required to arrive at a final state of utility or objective of the action research i.e. productivity improvement and successful frozen food package development that gained the continuity of sales growth.
- What is the overall crucial pattern of experience being captured from this action research that embraces the key success factors and the final business model enabled by logistical transformation in the organization? This question is addressed as a summary to the overall research findings in the conclusion section.

Research Design

The company's revenue was in the neighborhood of a higher end of Y,000 Million Baht after a systematic business model-wide transformation. The industry involved value-adding the raw seafood materials to a variety of ready-to-eat high-end retail food products. Diversity of, for instance, seafood raw materials in cultivated farms provided the strongest strain or stress for the entire organization's operations which complicated the works of the informational aspect of the logistics, namely master production scheduling and material requirement planning. These strains prevented the growth of the organization and the problems were further complicated by the misaligned departmental goals in particular those of the purchasing, production, marketing and sales and the inventory management. These issues were spiraled out of controls i.e. by reducing productivity, employee morale, reducing meat yield and thus wasting earnable margins, lowering seafood quality caused by the weakening of seafood color pigments and the inconsistency of quality in multi-faceted dimensions i.e. seafood texture. The implementation of Balanced Scorecard systems and the ERP systems still wasn't able to allow the organization to step outside this conundrum. It was only when the organization engaged systematically in an action research effort, of approximately 2 years of duration, that the light from outside the tunnel was seen and growing brighter. This research paper presented only the overall findings by synthesizing all the themes discovered and implemented and, only the logistics-driven

issues were emphasized whereas many other emerging research phenomena were not included in the discussion. What follows are the findings and discussions as per the stages of the proposed theoretical framework as shown in Figures 1 and 2.

Findings and Discussion

Having analyzed the structure of the industrial forces in working the organization realized the general weaknesses in both the supply and the demand side. While the former identified a loss-loss for the raw material (i.e. shrimps) supplier and the buyer organization caused by the normal auction practices that no one is in control of the sizes of the raw materials, the latter sees the customers not being able to easily customize their retail food products with high yield, innovativeness and robust traceable quality. The organization thus aimed to capitalize on this weakness by systematically re-examining the industrial norms of practices and suggested alternative platforms of business model. In doing so these weaknesses were transformed into growth drivers for the organization in the industry – that is, the organization was capable to co-streamline the business model with the active participation of both the suppliers and key customers.

To ensure effective presentation the findings and discussions will be organized in three stages namely knowledge creation stage, knowledge management stage and knowledge application stage. These three stages also represent the sequential events of logistics transformation activities and thus, the validation of them provides a useful theoretical model for possible analytical generalization and future research that could exploit questionnaire-based surveys. The process itself also served the emancipatory purpose in enlightening the participants and the organization with many subtle details and useful operations behaviors that were hidden under the surface of the originally proposed framework. This clearly demonstrates the usefulness of action research.

The following summarizes the research findings in an attempt to answer the two objectives raised earlier. Practically speaking, the proposed frameworks as shown in Figure 1 and Figure 2 are, to the organization, like strategy to realize the goals, and answering the two research questions are like studying and proposing the tactics to implement the strategy.

Critical reflection and findings

- For the action research stage, the set team discovered three enabling or restraining factors, namely reflection, leadership and team synergy. Note that forces of enabling or restraining nature were two sides of the same phenomenon.
- Reflection – The organization realized that active reflection allowed the team members and the employees of the organization to stretch their cognition and understanding, and this was made possible by promoting a questioning attitude, by challenging the employees to study the results critically and to rationalize the reasons for their work practices, and by setting an effective working and monitoring platform to help develop reflective insight and competency (i.e. by developing a work form that organized around the concept and dimensions of six-sigma DMAIC together with SPC graphical support). Consequently reflection shifted the organization from a reactive mode that awaited customer complaint or reports of audits to proactive continuous improvement attitude. In addition, reflection was effectively accomplished by the support of carefully reviewing the existent literature in many cycles within the two-year period, and it was discovered that literature review provided the set team the ability to parsimoniously organize the emerging knowledge so that the resultant knowledge can be widely applied throughout the organization and spread its wing of impacts far and in depth.
- Leadership and team synergy – It was discovered that as action research involved active experimentation and implementation of the proposed ideas that impacted on the entire business value chain or the business model, it was important the leader possessed the decision-making authority. In addition, leader must be able to foster an atmosphere and to develop a platform for effective communication, dialogue, ideas generation, brainstorming and committed actions among different members of the action research team. As the team involved the suppliers, the customers and the team members, the leader's role had to show role model that won the supports of all the stakeholders, which was made possible by the leader being capable to integrate wide ranges of ideas and turned them into implementable work practices in auditable quality management systems i.e. ISO 9001, ISO 22000, HACCP, GMP, BRC, and FMS. In short, the leader must be able to set the context for everyone to actively participate and engage in the common research theme. Also, leader without the supporting team was seemed to be less effective and thus team synergy was considered similarly important. Throughout the success and failure experience of the research, it

was found that team diversity of different role competencies was necessary in order to produce useful creative suggestions and to secure commitment for implementation of ideas and strategies. In addition the teams had gained significantly from the platform of immediate feedback i.e. by developing a DMAIC oriented work forms and KPIs (Key Performance Indicators) assessments, as checkpoints which provided the thrust and motivational energy to verify and validate their works and to move forward with full swing.

- For the knowledge management stage, the team members discovered work forms designed using the concept of DMAIC were useful which also provided immediate feedback for responses and traceability that ultimately linked to the ERP databases. When DMAIC-oriented work instructions and work forms were re-engineered operations wide, it provided useful knowledge sharing and communication media. In addition, ERP reports-generation must be trained to the supervisory and managerial levels including how to use them to help extract useful strategic information. In addition, DMAIC culture ensured active engagement of the employees in continuous improvement to continually update know-how, know-what, know-who and know-why.
- For the success of the entire business model implementation, it was discovered that organizational culture was very effective means as it fostered shared understanding and values, and also promoted active willingness and commitment. In addition the success of business model implementation was pivotal at common shared theme – i.e. to produce efficiently tastier, fresher and innovative seafood products adaptably and flexibly to cope with the diversified thirsts of the consumers and the retail customers.

Utility findings

- A crucial utility of the action research was concluded – Positive results of action of the co-created ideas produced excitement, further promoting motivation and developing commitment which moved the team's efforts forward, and also positive results gained the trust of the entire organization and the support of the CEO which helped to propel the project to impact on the entire business model.
- Knowledge management allowed data and information to be quickly re-organized to produce knowledge useful for a wide range of contexts i.e. meat yield maximization, color pigments optimization, activity-based costing, identification of potential bacteria threats points and thus suggesting equipment and infrastructure cleaning work practices, responsive audit assessment and customer complaint handling, speedy food recall process, budgeting, and new product development and market penetration.

The utility of the logistics-enabled business model transformation is captured in the business model as follows:

- Contract farming relationship was created to support the growth strategy of the business and was subjected to continuous improvement and learning, and quality improvement in both farms and hatchery management was collaborated and audited by a diversified teams including the retail customer groups, which included the dimensions of traceability, structures and equipment, feed and water, animal health, procedure and systems and environment.
- ORACLE based master production and material requirement planning was developed, which was supported by the daily seafood raw material's price intelligence analysis and the forecast of raw material size maturity in order to satisfy order needs and anticipated partnership programs.
- Inbound logistics transformation (reflected by the indicators like speed of delivery, and quality of the delivery in terms of raw material temperature and texture) to ensure high-yield of seafood raw materials and excellent translucent color and good texture capable to use for high-margin ready-to-eat food products.
- Implementing the use of DMAIC (Define-Measure-Analyze-Improve-Control) oriented work instructions and work forms in the ISO 9001 QMS (Quality Management System) and FMS (Food Management System) in every facet of the factory operations, in logistical issues, production and quality controls, auditing, infrastructural provision maintenance (i.e. air, water, steam heat, freezers), R&D, NPD (New Product Development), inventory controls, purchasing, engineering maintenance, waste treatment and pest controls, and facility cleaning.
- A robust food traceability system was installed within the ISO 9001 and ISO 22000 food quality management system, supported by the real-time databases in order to secure confidence and brand trust of the customers for quick rapid recall capability, quality related troubleshooting, food quality improvement such as yield analysis for profitability and the nature of historical problems, and even production costing.
- Streamlined and redesigned production flow and its logistical and labor supports.

- Use of KIPs (Key Inspection Points) which was a concept borrowed from KPIs (Key Performance Indicators) for food production and logistics equipment cleaning work practices.
- Logistical competencies from the farm to table were driven by a simple theoretical concept, which was only obvious when the organization used action research that also relied on the literature review, namely the "Food Safety Objective (FSO)" which was governed by a simple equation: Ho - $\sum R + \sum I \leq FSO$, where Ho is the initial level of hazard, $\sum R$ is the cumulative (total) decrease in level of hazard, $\sum I$ is the cumulative (total) increase in level of hazard (due to recontamination and/or growth), and $\leq$ is preferably less than, but at maximum equal to.
- The action research teams also exploited a "simple numerical analysis" to estimate the right temperature and time duration for safe cooking of seafood products within the initial given context of the logistical data which can also be applied to food shelf-life analysis and meat yield optimization. In this, the team used the theory of numerical integration and the theory of lethal rate to optimize seafood meat cooking yield for better profit margin, seafood product color and texture.
- For shipment to customers, order lists were picked from the ERP systems robustly and products quickly be moved to the vehicle which was pre-cooled to 10° Celsius or lower and appropriate data-logging was installed to ensure full traceability.
- Visitor logistics were also streamlined and carefully checked to prevent cross-contamination, i.e. visitors and contractors consuming nuts prior to entry into production sites were alerted and subjected to hand-washing procedures and also inner cloth not contaminated by nuts in any circumstances.
- Waste water management and logistics were also monitored to correlate with the production sites. For instance, the 5-day BOD which measured the amount of oxygen consumed by biochemical oxidation of waste contaminants in a 5-day period also reflected the production sites work practices and the attitude.
- The logistical issues of steams and water systems into the production sites were also carefully studied to prevent possible bacteria infiltration and cross-contamination. For instance, water supply taps were all knee-operated with simple four-bar-linkages to prevent unnecessary cross contamination between the hands and the water taps.
- The entire quality assurance system was based on this robust knowledge management / traceability systems, and its efficiency depended upon the ability to track each individual product and distribution (logistics) unit, in a way which embedded continuous monitoring from primary production (harvesting, catch, and production) until final disposal to consumers.

In sum the action research essentially yielded the following business model as shown in Figure 3 in which MPS (Master Production Scheduling), MRP (Material Requirement Planning) and FSO (Food Safety Objectives) provided the enabling policy systems to meet the targets of the order-winning operations KPIs (Key Performance Indicators) which then drove the operations of the business model.

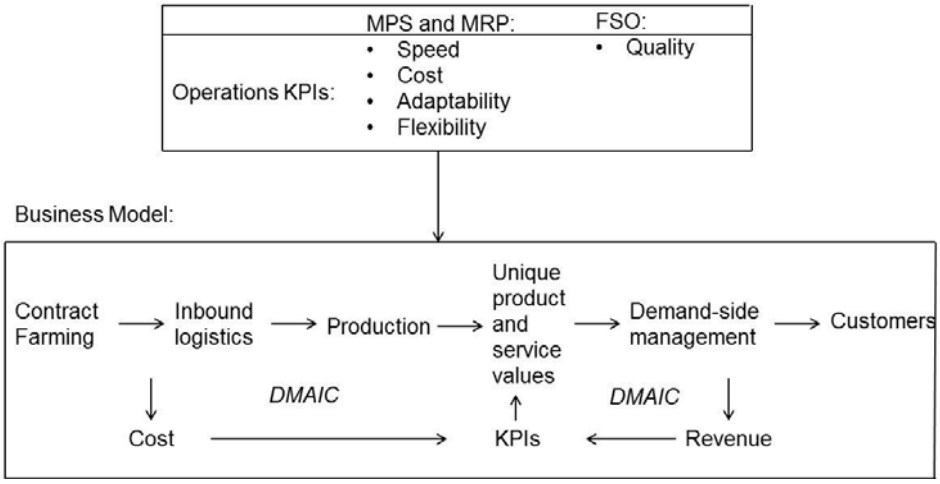

Figure 3: Transformed Business Model

Conclusions

This action research indicated clearly that while the originally proposed model could be perceived as "strategy", the enabling and restraining forces being identified through critical reflection of the set team could be interpreted as the "tactics" to help realize the goals (the "utility") of the action research. Thus, action research leads to the formation of rich knowledge that is captured in tactics, strategy and the cause-and-effect patterns of the utility of the research.

While the positivistic deductive research approach structuralizes the key patterns of variables, action research was shown to be able to help identify the subtle details situated below the surface. The usefulness of action research is clearly shown i.e. in enabling emancipatory learning and in providing a channel for new knowledge acquisition of the organization, and the platform of "action" in the research cycle allows the design-build-operate-transform of new concepts which systematically and holistically affect the entire business. In short, action research provides not only a platform to validate the conceptualized business strategy but also to arm the employees with proven tactics and work practices that lead to positive results and are thus considered as a useful reinforcing mechanism to increase the odds that the employees in the organization will behave according to the shared goals.

Overall, this research concluded that knowledge management in which food traceability system is based and in which core competencies are derived is extremely vital and its success is pivotal to the role of leadership, team synergy, organizational culture, the hardware and software and the alignments and reinforcing fitness of the business model activities. Traceability, to be successful, must capture both logistics traceability (i.e. points of origin, etc.) and qualitative traceability (i.e. information relating to the source of hazard and the cause that generated it, the conditions and methods of production and the quality of products and processes).

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A REVIEW OF SUPPLY CHAIN INNOVATION: PAST, PRESENT AND FUTURE

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Introduction
Studies of supply chain innovation (SCI) tend to focus on identifying antecedents for innovation (e.g., Grawe, 2009) and innovation process (e.g., Krabbe, 2007; Wagner, 2008) in a supply chain or network context but less is known about the types of innovation actually being created and how they were created. Systematic research and knowledge about SCI is under developed (Arlbjørn et al., 2011). This paper reviews past and present innovation in systems, methods, technologies and processes for supply chain applications and discusses future research in SCI.

Literature review
Research on SCI still lacks of common terminology, of agreement about the conceptual understanding, and of related empirical work (Arlbjørn et al., 2011). Following the work of Flint et al. (2005) on logistics innovation and (Arlbjørn et al., 2011) who explored SCI, this literature review aims to identify key concepts and terminologies from the innovation management literature which can be used for advancing SCI research, and then reviews the relevant literature specifically on SCI.

Innovation is about turning opportunity into new ideas and putting these into widely used practice (Tidd et al., 1997). Innovation can also be defined as the adoption of an internally generated or purchased device, system, policy, program, process, product, or service that is new to the adopting organization (Zaltman et al., 1973). Other scholars argue that it is important to differentiate “diffusion” from “adoption” (Kimberly, 1981) and that they are not the same as “innovating” and “innovativeness” (Van de Ven and Rogers, 1988). A more process view of innovation (innovating) sees innovation as an ongoing process of leaving, searching and exploring which results in new products, techniques, forms of organization or markets (Lundvall, 1992). Innovation is a means to react to competitive and institutional pressures from the external environment. Innovation is a process of creative destruction for organizations to renew the value of their asset endowment (Schumpeter, 1934). As the core renewal process in any organization, innovation changes what an organization offers and the way in which it is created (Bessant et al., 2005). From a resource-based view, organizations often engage in different innovation acts to attain and maintain distinctive competencies required to perform continuously well (Barney, 1991; Bryson et al., 2007; Christmann, 2000).

Innovation comes in different forms, sizes and shapes. To achieve a clear understanding of innovation and to develop realistic theories of organizational innovations, it is important to differentiate between the different types of innovations and stages of innovation (Damanpour, 1987). Innovation can be differentiated based on basically three dimensions: object of change, newness, and the ways innovation is created. Based on the object of change, many types of innovation have been identified: product/service, technology/process, system, practice, market, organizational (structure), people, and so on (Schumpeter, 1934; Walker, 2004; Bantel and Jackson, 1989; Daft, 1978; Damanpour, 1991; Damanpour and Evan, 1984). Among these, product and process innovation are two commonly studied types of innovation (Walker, 2004). The literature generally recognizes the differences between technical and administrative innovation. Technical innovation is more related to products, services and production process technology (Damanpour and Evan, 1984). Administrative innovation involves organizational structure and administrative processes, which are indirectly relate to basic activities (Damanpour, 1991).

Innovation can be rather radical in one extreme and incremental in another. Innovation may have different degree of novelty, significance and uniqueness (Varis and Littunen, 2010). Concepts used to differentiate the novelty and significance of an innovation include “variation”, “reorientation”, “routine”, “nonroutine”, “ultimate” and “instrumental” innovations (Normann, 1971; Nord and Tucker, 1987). Take product innovation as an example, Anderson and Tushman (1991: 27) view product innovation as “technological discontinuities that advance by an order of magnitude the technological state-of-the-art which characterizes an industry”. Radical innovation is expected to create new value propositions for the customers. For example, online ticketing companies allow customers to purchase tickets anytime from anyway in a much quick way. Instead, incremental product innovation means “the development

of products that have minor changes in attributes, and the benefits from these changes are minimal from the customer"s perspective" (Hoonsopon and Ruenrom, 2009: 156).

There are many ways in which an organization can innovate. It is not as simple as being radical or incremental. It is about putting the "right" conditions or institutional environments in place. It involves fostering of creativity and creation of new knowledge. It is also about introducing the "right" innovation at the "right" time. Sometimes there is a first-mover (Lieberman and Montgomery, 1988) or early-mover advantage (Cleff and Runnings, 2012). First-mover advantage rises as industry fragmentation and increasing innovation velocity (Gilbert and Birnbaum-More, 1996). Market pioneers often have a higher survival risk than early followers when it comes to radical innovations (Min et al., 2006). Evidence suggests that slower market pace enables pioneering firms to achieve more enduring first-mover advantage (Suarez and Lanzolla, 2005). There is another theory which argues that small firms are better in innovation. According to the theory of disruptive innovation (Christensen, 1997), large organizations can be toppled by much smaller start-ups by allowing them to develop solutions for relatively small and unattractive markets which later become popular (e.g., the Southwest airline with the low-fare services). Anecdotally radical innovation is mainly driven by small firms or start-ups, very often without an established brand name (Markides and Geroski, 2005).

It is crucial to differentiate different stages of adoption because innovation or adoption of innovation is not a binary process. There are typically initiation stage and implementation stage (Rogers, 1983; Zaltman et al., 1973). Initiation stage involves "all activities pertaining to problem perception, information gathering, attitude formation and evaluation, and resource attainment leading to the decision to adopt"; and implementation stage "consists of all events and actions pertaining to modifications in both an innovation and an organization, initial utilization, and continued use of the innovation when it becomes a routines feature of the organization" (Damanpour, 1991: 562). Furthermore, the rates of product and process innovations are different during the stages of the development of a business (Utterback and Abernaathy, 1975). The introduction of a disruptive technology is often followed by a series of incremental innovations; the adoption of such technologies involves multiple levels (Brand and Huizingh, 2008).

Determinants of successful innovation can be broadly divided into firm-level and network-level characteristics. At a firm-level, variables such as specialization, functional differentiation, professionalism, formalization, managerial attitude toward change, managerial tenure, technical knowledge resources, administrative intensity, external communication and internal communication have been identified as determinants of organizational innovation while centralization and vertical differentiation are known to have negative effects on organizational innovation (Damanpour, 1991). Competitive intelligence, strategic leadership effective management of technology and innovation process are among other characteristics of firms with successful innovation (Guimaraes, 2011). Size and length of establishment may also affect the firm"s innovative behaviour (Avermaete et al., 2003).

Within an organization, innovation can be created by individuals and cross-functional collaboration. Beyond an organization, innovation can be created by strategic alliance or so-called network innovation (Wissema and Euser, 1991) and open innovation (Chesbrough, 2003). SCI is a unique form of innovation taking place within a supply chain. SCI is a fairly new topic within the supply chain literature; a quick search of ABI/INFORM database using "supply chain innovation" as the title as keyword found only eleven articles. SCI is defined as "a complex process which deals with uncertainty in the environment, so as to provide solutions for customer needs and find new ways to better organizational processes using new technologies" (Lee et al., 2011:1194). SCI often involves technology (method) and process innovation. SCI "combines developments in information and related technologies with new logistics and marketing procedures to improve operational efficiency and enhance service effectiveness" (Bello et al., 2004: 57).

Since SCI is a rather new topic, there is currently a lack of literature which lays down its theoretical foundations. The review of logistics innovation literature by Grawe (2009) identifies the following relevant theories: knowledge-view of the firm, dynamic capabilities, Schumpeterian innovation framework (on firm size and available resources), exploration-exploitation framework, S-curve (Chandy and Tellis, 2000), network theory and resource advantage theory. Most of these theories can be used to explain the determinants of SCI.

Methodology

This paper is based on a review of existing literature and online forums among practitioners. The online article "The top 10 supply chain innovations of all-time" published by SupplyChainDigest (Gilmore, 2010) and its discussion forum is the main basis for identifying the relevant SCI. Although innovation has been studied extensively, there is generally no accepted way of measuring innovation. Some research is based on R&D expenditures others refer to the number of new patents (Breschi, 1999; Malerba and Orsenigo, 1995). Instead, the choice of relevant innovations for this paper is based on innovations that have relatively significant and long-term influences on contemporary supply chain management best-practices (Varis and Littunen, 2010; Gilmore, 2010). Following Zaltman et al. (1973), the analysis further classifies the types of innovation into methods, technology, process and other relevant categories. The analysis also attempts to identify the approaches (including drivers and enablers) used to develop each innovation. Particularly, the analysis identifies if the innovation was generated by a single individual or several individuals within an organization ("in-house") or a group of different organizations (of the same or different tiers or sectors). In addition, the drivers and enablers of the innovation, such as customer needs, industrial problems, internal organizational characteristics, existing of new technology from outside of the organization and so on, are identified. These drivers and enablers also serve as the platform for identifying future development of SCI.

Results

Table 1 summarises the results of the analyses of the past and present major SCI. Even though many of the listed innovations were not developed in a supply chain setting, they are included because of their relevancy and implications to today"s supply chain management. The list is by no mean complete because there may be other innovations that were not reported in the literature.

Name	Era	Types	Radicalness	Approaches
Computerized reorder point / EOQ	1910s-1600s	Methods; Technology	Radical, long-term influence	In-house, several individuals
Ford Assembly Line	1910s-1940s	Process; Methods	Radical, long-term influence	house, several individuals
Barcodes / QR codes / RFID	1960s-1990s	Methods; Technology	Radical, long-term influence	Collaboration, industrial / single individual
MRP/DRP	1700-1800s	Methods; Technology	Radical, long-term influence	In-house, several individuals
Taylorism	1980-1990s	Process; Methods	Radical, long-term influence	In-house, several individuals
Six sigma	1980s	Process; Methods	Incremental, long-term influence	In-house, single individual
FedEx Tracking System	1980s	Methods; Technology	Incremental, long-term influence	In-house, several individuals
3M"s Transportation Load Control Center (LCC)	1990s	Methods; Technology	Incremental, long-term influence	In-house, several individuals
Ocean shipping containers	1990s	Methods; Technology	Radical, long-term influence	In-house, single individual
"Supply chain"	1990s	Concept	Radical, long-term influence	Collaboration, industrial
Toyota Production System	1910s-1990s	Process; Methods	Radical, long-term influence	In-house; several individuals
ERP / APS	1990s-2000s	Methods; Technology	Incremental, long-term influence	Outsourced; various individuals
P&G"s continuous replenishment – CPFR	2000s	Methods; Technology	Radical, long-term influence	In-house and collaboration

Table 1: Supply chain innovation (past and present)

Among others, inventory is one of the main problems in supply chains. Economic order quantity (EOQ) is a mathematical solution to determine order quantity with the least total cost of holding and ordering inventory. The EOQ concept was published by a Westinghouse Engineer called Ford Whitman Harris in 1913 (Harris, 1913/1915). However, it was a much later article in Harvard Business Review by RH Wilson (1934) that made EOQ mainstream. With the development of computers in 1950s some

companies started to develop computerise inventory control systems by incorporating concepts such as reorder point (ROP), EOQ and safety stock developed by the academics.

To keep track of inventory status and sales orders reorder a punch card system was developed by Harvard University in the 1930s. This system was not widely used as it was too expensive and it was not able to cope with the high level of complexity retailers at the time. The first patented barcode (called article classification…through the medium of identifying patterns) for recognising product at checkout was issued to Joseph Woodland and Bernard Silver in 1952. In the 1960s, a group of retailers (mostly grocery stores) got together and came up with a new method for tracking inventory: barcode. Several competing types of barcodes were then being developed and later they were being standardised with the Universal Product Code (UPC) in 1974. The idea for such a standardised code (called Universal Grocery Products Identification Code or UGPIC) was first developed by a company called Logicon and the effort was later completed by an engineer from IBM called George S. Laurer (Gilmore, 2010). Because barcode holds limited information Denso Wave Incorporate (led by Masahiro Hara) developed a new two-dimensional (2D) code called QR (Quick Response) code, which was being adopted by automotive industry to track their electronics Kanban (www.qrcode.com). Because consumers nowadays would like to know more about the products they are purchasing and the availability of mobile devise that can easily read QR codes, QR codes became widespread in Japan in early 2000s, and they are rather common today worldwide. This is made possible because Denso Wave decided not to exercise their pattern right for the QR codes. Taking advantage of the availability of standardised barcodes, handheld scanners, Internet, EDI and mobile networks, FedEx re-invented express shipment shipments by developing a new computerised tracking system in the 1980s that provides near real-time information about package delivery. Today, track and trace becomes a rather common application for tracing delivery.

The idea of an assembly line was first developed by Henry Ford (and his production chief, Charles Sorensen) back in 1910s at the new Detroit factory (Eisenstein, 1988). The idea actually came from the flow systems of meat packaging operations in the Midwest. Instead of moving around to pick up parts and assemble these parts onto a stationary vehicle Ford assembly lines moved the vehicle and parts to allow assembly workers to focus on assembly tasks and subsequently reduced the cost and lead time of the assembly operations significantly. It was Ford assembly line systems that revolutionised contemporary production systems for large-volume products in almost all sectors.

Computerised Material Requirement Planning (MRP) systems were initially developed during early 1960s when American Bosch started to examine bill-of-material explosion and calculate material requirements (Peeters, 2009). IBM (e.g., Oliver Wight, Joseph Orlicky, and others) documented this method and later developed a bill-of-material processor (BOMP) which then further developed the Production Information and Control Systems (PICS). Many consider PICS as the “mother of all MRP systems” (Peeters, 2009). Concepts such as dependent and independent demand, time-phased demand (bucketed), net demand and gross demand were all developed by IBM. IBM commercialised PICS (called COPICS) since late 1960s, and companies such as General Electrics and Royal Philips Electronics became some of the early adopters, who also developed their own systems (Peeters, 2009). This innovation was partly driven by the availability of new technology at the time called disk storage (methods to randomly access to information in a storage) and computer for solving complex bill of material explosion problems. IBM"s efforts to further develop MRP systems have in fact contributed to the early development of Enterprise Resource Planning (ERP) systems in the 1970, when MRP was becoming popular.

During the 1970s computerised inventory control and MRP became rather common. To solve conflicts between manufacturing and distribution managers (Masters et al., 1992), Whybark (1975) outlined the concept called Distribution Requirement Planning (DRP). Andre Martin (Martin, 1983) from Abbott Labs Canada applied MRP and inventory control concepts and developed the first computerised DRP system (Gilmore, 2010). During mid-1970s some bespoke-DRP software systems were available in the market thought many companies attempted to develop their own systems. A study of the adoption by Masters et al. (1992) suggested task complexity (of bill of material, distribution systems and market structures) was a key driver for DRP adoption while organizational size was an important predictor (in addition to experience with MIS/MRP) of the successful adoption.

Taylorism was developed by Federick Taylor (Taylor, 1911) as he implemented scientific management inside the factories in the 1980s and extended its influence until 1920s. He applied time studies on the

factory floor and established “standard times” for manufacturing tasks. He also established incentive systems and piece-rate pay to promote productivity. The ideas of empiricism, work ethics, elimination of waste, standardization, and best practices were established during the Taylor"s era. Taylorism was rather radical because many of the techniques were controversial at the time and they significantly improved the productivity of manufacturing processes.

Six Sigma (Tennant, 2001) is a set of techniques and tools for process improvement developed Motorola by (Bill Smith, senior engineer) in 1986 and this technique has now been applied by large and small manufacturing and service organizations. Six Sigma is not just a set of statistical tools for measuring process capability; it consists of methods and processes for managing process improvement. However, it was described as “nothing new” by Joseph Juran, another quality management guru that the idea of “facilitators” was not new but it was being adopted and called belts with different colours. Six Sigma was criticized as over-relying on statistical tools while the effectiveness of using “black-belts” as change agents and emphasis on learning have been widely recognized (Gilmore, 2010). Since many similar methods were already being developed by other quality management gurus and Six Sigma is considered an incremental innovation but nonetheless it has long term implications to today"s manufacturing and supply chain management.

Another incremental innovation developed by 3M focused on solving distribution problems. 3M pioneered the idea of a centralised transportation planning system for achieving network optimization in 1980s. Instead of having each factory or warehouse (called load centre) to makes their delivery plan, Roy Mayeske, at the time the Executive Director of 3M Transportation, led a project to develop a centralised transportation planning systems for creating network synergies (Gilmore, 2010). Today, centralised transportation or distribution planning applications are becoming an important system for planning and optimising logistics activities, appreciated by especially large logistics service providers. There may be further room for improvement, as there is still a need to integrate such transportation planning systems with the manufacturing or ERP systems.

The first shipping container was invented and patented in 1956 by an American named Malcolm Mc Lean (Levinson, 2006). Mc Lean was a trucker and he owned the trucking fleet in the South and the fifth largest trucking company in the USA by 1956. Before the invention of ocean containers, cargo was loaded and unloaded in odd sized wooden crates. The process was very slow and there were no standardised loading units. After observing this slow and inefficient process for 20 years, Mc Lean developed some standardised way of loading cargo from trucks to ships and warehouses. He later purchased a new shipping company called Sea-Land Shipping and experimented better ways to load and unload trucks and ships. After many experiments, his final design is what we know now as the shipping container. Only by early 1970s the globally accepted ocean containers (ISO containers) were standardised by the US Navy. This innovation changed the lives of everyone because the cost of loading cargo was significantly reduced by using ocean shipping containers and over 90% of today"s global trade is enabled by this rather “simple” and “cheap” solution.

The concept “supply chain” itself is considered as an innovation for some supply chain practitioners (Gilmore, 2010). The idea came from consultants named Oliver and Webber (1982) who highlighted the interdependency among suppliers and customers along a supply chain and therefore the need for considering the entire supply chain as a single entity rather than fragmented responsibility for various segments in the supply chain (Houlihan,1987). In a way the birth of “supply chain” concept revolutionises the ways managers manage their businesses.

Toyota Production Systems (TPS) is more than a series of methods and processes; it is a culture. TPS was pioneered by Pioneered by Taiichi Ohno and a few colleagues in Toyota. It is hard to specify a year when TPS was established; TPS has been developed based on a lot of trials and errors since early 1910s. TPS is guided by principles called “The Toyota Way”, which emphasises continuous improvement and respect for people (Liker, 2004). According to Liker (2004) there are 14 principles of Toyota Way: long-term philosophy; the right process will produce the right results; add value to the organization by developing your people; and continuous solving root problems drives organizational learning. TPS utilises principles of lean manufacturing and just-in-time (JIT), and emphasises that quality take precedence. Some of the TPS principles and methods come from Ford assembly Line and Total Quality Management. While many organizations have attempted to imitate TPS few managed to learn the two TPS paradox: the first paradox refers to the empowerment of workers to inspect, stop the line, performing more tasks, and even redesign their own jobs (Ward et al., 1995), and the second

refers to the delays in making product design decisions and the use of set-based concurrent engineering approach for product development (instead of point-based concurrent engineering).

Continuous replenishment can be considered the precursor of ECR and CPFR. In fact the earlier computerised continuous replenishment application was developed by IBM during 1980s and applied in several sectors. P&G in 1987 bought a mainframe with such an application and modified it for consumer goods for retail (Gilmore, 2010). They then implemented the continuous replenishment application with their customers such as Schnuck"s Markets and Kmart (Gilmore, 2010). Though the collaboration with Kmart was not successful, later collaboration with Wal-Mart helped Wal-Mart to gain significant advantage, leading to the development of ECR and CPFR.

One current trend of SCI is the development of more “intelligent” systems based on the current revolution of Internet, cloud and mobile technologies. Advanced Planning Systems (APS) and business intelligence applications are being developed to enable advanced supply chain planning taking into account market and operations intelligence and at the same time capable of exploring what-if scenario using real-time information. While marketing experts are developing methods to market products by capturing Big Data from social media, supply chain experts are now starting to explore the possibility of using data available in the Internet to manage the supply chains. Another growing trend is the use of robots (intelligent machineries) to replace for example warehouse and assembly workers. For example, Amazon has ordered a lot of robots for moving goods in their warehouse, and Microsoft has acquired companies specialised in robots, and so on. Finally, supply chain experts are now getting more involved in eco-innovation, aiming to cut down environmental damages and labour issues owing to the various supply chain activities. In addition to technological solutions, new forms of collaboration in vertical, horizontal, multi-stakeholder are being formed to address environmental and climate change issues.

Discussion and conclusion

The above analysis shows that most of the high-impact with long-term influence SCI was actually developed in-house by a small number of individuals to solve problems they face. Often when standardization across an industry is necessary organizations started to collaborate and innovate new solutions together (e.g., barcodes). All of the innovations involve development of new methods to solve problems related to the management of inventory, tracking of items, planning, production and performance. In many instances technologies that were developed from other industries (e.g., IT) presented new opportunities to innovate new ways of managing the supply chains. When it comes to process innovation (which may also include systems) there seem to be common to learn from other industries or competitors. Somehow the willingness to invest in trial and error appears to be one of the major enablers of some of the radical innovation. In some cases the individuals involved in leading the innovation (change) are rather unique and extraordinary in the ways they insist better ways must out there somewhere.

The above analysis concludes that most of the famous innovations in production, inventory and logistics technologies, systems and processes such as Taylorism, Toyota Production System (TPS), Ford Assembly Line, Six Sigma, DRP, MRP, ERP, computerized EOP, EOQ, SM"s load control center (LLC), P&G"s continuous replenishment, FedEx tracking system and automatic picking system (APS) invented in before 1990s have now become the basis for many manufacturing and service organizations for managing their operations and supply chain. 2000s can perhaps be called the “collaboration” era, where VMI, cross-docking ECR, CPFR and different forms of (vertical) collaboration are being implemented. The next era of SCI depends largely on technology advancement. Nowadays SCI is largely relying on technology companies and R&D centres, meaning manufacturing and service organizations need to collaborate with such organizations in order to gain first- or second-mover advantage. Even though the use of smart robots and vehicles, Internet-based information technologies (cloud, Big Data, Web 2.0) are emerging, the rate of adoption appears to be rather slow. There is a need to demonstrate to supply chain managers how they are different from the current legacy systems. In addition, eco-innovation is another avenue for supply chain managers to explore, so that they provide new platforms for achieving even better market access, and supply chains cost and eco-efficiency. In order to achieve eco-innovation which decouples growth from environmental impacts, there is a need to develop disruptive technologies and this can no longer be achieved by several individuals in an organization. Driven by globalization and global uncertainties there is a need to collaborate vertically, horizontally and bilaterally. Network-enabled innovation is therefore a new way for achieving innovation (Narasimhan and Narayanan, 2013).

This paper contributes to SCI literature by mapping out the major SCI in the past and present and identifying some future SCI and their challenges. Though this paper put more focus on SCI that has significant long-term influence in today"s practices, there are many other innovations taking place within many organizations. The CSCMP supply chain awards provide good examples of organizations achieving various types of innovations (in process, technology, network structure and organization). A recent analysis of 36 nominees for the 2005-2009 CSCMP awards by Arlbjørn et al. (2011) reveals that radical innovations have been achieved largely via technology innovation while very few are related to network (structure) innovation. Some detailed analysis of logistics innovation process based on case studies of large logistics companies by Flint et al. (2005) reveal that logistics innovation is a customer value-oriented social process that often requires investment in training and modification of business environment.

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Logistics Cost in Wooden Furniture Industry

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Abstract
This analysis of logistics cost in Wooden Furniture Industry started from gathering all the cost information in the factory. Then, the Activity-Based Costing (ABC) was applied and used for the cost analysis. Four types of costs were examined: labor cost, land cost, machinery cost, and material cost. After that, cost calculation was distributed to all resources and to evaluate the total cost. Then, the total cost was divided based on 13 logistics activities to identify the logistics cost. This cost analytic method can propose a practical way to improve logistics cost of the industry for more efficient and effective management.

Keywords: Logistics Cost**,** Furniture, Activity-Based Costing

Introduction
Furniture Industry has nowadays become a popular and a highly competitive business in Thailand. Most business try to manage their investment funds to providing cheap goods and customer service along with satisfaction. Furniture Industry is one of business that the government is focusing on its high capability of market competition because of its potential contribution to the Thai economy. Approximately 59,000 – 60,000 million baht of the market value was generated and it has expanded 7 – 10 percent compared to 2012. Manufacturing costs including design and engineering activities have critical impacts on overall manufacturing costs. Many of the problems encountered in manufacturing can be traced back to the design process. In wood products companies such as furniture firms, there are many manufacturing problems that arise because of a bad design. [1]

The purpose of this research is to reduce logistics cost in furniture industry, especially on inventory cost, transportation cost and administration cost. This research analysed the cost by Activity-Based Costing (ABC) techniques and proposed a way to reduce logistics cost of the wooden furniture industry.

Literature review
Costs can be calculated in many ways. Activity-Based Costing (ABC) systems have been developed to improve the costing system, and claimed to be more accurate than traditional costing methods . David J. Robb studied supply chain and operations practice and performance in Chinese furniture manufacturing. They proposed and developed a model exploring these connections, utilizing data from a survey of 72 furniture manufacturers located throughout China. The industry is of particular interest in that, while labor productivity remained relatively low, exports had undergone substantial growth[2].

Logistics activities are searching constantly for ways to improve process capabilities, shorten throughput times, improve quality, and cut costs. Thararoop C. [3] studied logistics cost of industrial adhesive company. It was found that the highest logistics cost is transportation cost (63%). The second, third and fourth highest cost were logistics communication cost (19%) , material management cost (7%) , warehouse and storage cost (6%). The results showed that batch picking and routing order picker reduced the distance used in picking up the products by an average of 30% per day. The reduction of distance had a significant effect on the fuel cost of forklift. All so Kanlaya P.[4] studied logistics activities occurring in the process of exporting Nam-Dok-Mai mangoes and studied problems and barriers in each activity. The result of this research revealed that there were six logistic activities occurred in exporting process with composed of transportation activity, receiving and storage activity, material handling activity, customer service activity, packaging activity and inventory management activity. The problems found in each activity caused an increased in cost and lowered in the product quality. The critical problem was occurred in transportation activity. The results of this research can be used by exporters to improve and reduce the problems in their supply chain which can increase the national competitiveness of exporting Nam-Dok-Mai mangoes from Thailand.

Steps of designing ABC system
Activity-Based Costing (ABC) is a costing methodology that identifies activities in an organization and assigns the cost of each activity with resources to all products and services according to the actual

consumption by each. This model assigns more indirect costs (overhead) into direct costs compared to conventional costing. Onsanit S. [5] analyzed cost reduction on logistics using Activity- Based Costing (ABC) of Johnson Control & Summit Interiors Limited. The research results were found that the organization structure in accordance with job description, including managing directors and managers of each of total 11 departments, and then analyzed activity of each department divided into 3 steps: identifying activity, reporting activity, and cost driver. Moreover, in applying this Activity-Based Costing (ABC), it allowed the company to know the actual cost of logistics activities, which the use of the traditional cost system could not provide the details of each cost. The guideline in cost reduction in this research were proposed 3 approaches: reducing resource cost, reducing cost of plastic packaging, and reducing cost by integrating activities, and all these would enable the company to reduce the cost and increase profits.

The type of cost information needed and the scope of interest (company, production, plant, and department) should define before creating an ABC system. [6] The steps of designing an ABC-system are presented in Fig. 1. Starting the creation with documenting the material flows provides useful knowledge for identifying activities and resources. The existing cost information system can be used for identifying resources and costs, because ABC does not change costs themselves, but the allocation of costs. The identification of first-stage cost drivers is connected with identification of resources. The first-stage cost drivers are used for assigning cost of resources to activities. The unit price for a cost driver is calculated by dividing the resource costs by total output or capacity of the resource. Finally, the costs of objects can be calculated [7].

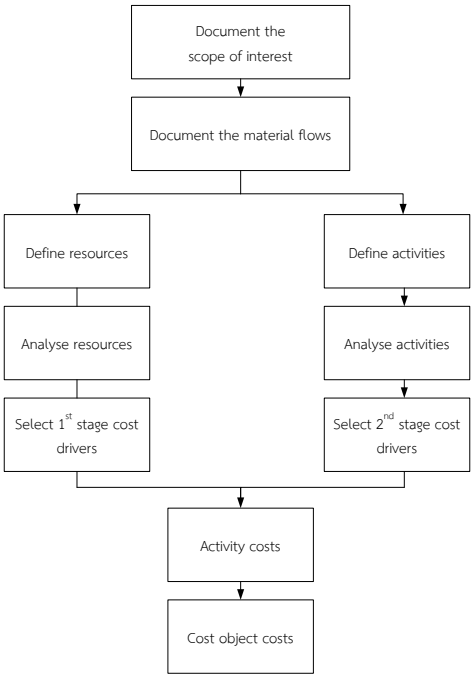

Fig. 1. The steps of designing an ABC-system.

Logistics Activities

Sudtivardnarupud K.[8] defines logistics activities as activities supporting internal operation of an organization in order to connect different departments and units as well as connecting outside the organization in terms of both demand and supply. Besides, Banomyong R.[9] divided logistics activities into 2 groups: 8 main activities of the organization and 5 supporting activities of the organization as shown in table 1.

main activities	sub activities
1.Customer service	9.Part and service support
2.Order processing	10.Plant and warehouse
3.Demand forecasting	site selection
4.Inventory management	11.Material handling
5.Transportation	12.Package and packaging
6.Warehousing and storage	13.Logistics communications
7.Reverse logistics	
8.Purchasing	

Table1 shows main activities and sub activities

Customer Service is the provision of service to customers before, during and after a purchase. According to Turban et al.[10], "Customer service is a series of activities designed to enhance the level of customer satisfaction– that is, the feeling that a product or service has met the customer expectation."

Order Processing the flow of materials into an organization is usually initiated by a purchase order sent to a supplier. To prepare this a purchasing and does everything needed to get materials into the organization.

Demand Forecasting is the activity of estimating the quantity of a product or service that consumers will purchase.

Inventory Management sets the policies for inventory. It considers the materials to store, overall investment, customer service, stock levels, order sizes, order timing, and so on.

Transportation moves materials from suppliers to an organization's receiving area. For this, managers have to choose the type of transport (road, rail, air, etc.), find the best transport operator [11].

Warehousing and Storage moves materials from the receiving area into storage and makes sure that they are available when needed.

Reverse Logistics even when products have been delivered to customers, the work of logistics may not be finished. Sometimes there are problems with delivered materials and they have to be collected and brought back.

Purchasing refers to a business or organization attempting to acquiring goods or services to accomplish the goals of its enterprise.

Part and Service Support logistics activities are usually spread over many locations. For instance, stocks of finished goods can be held at the end of production, moved to nearby warehouses, sent to regional depots, put into stores near to customers, passed on to third parties, or a range of alternatives.

Plant and Warehouse Site Selection is a general term for the activities that deliver finished goods to customers, including outward transport. It is often aligned with marketing and forms an important link with downstream activities.

Material Handling is the general term for moving materials within an organization. Every time that materials are moved around operations, it uses materials handling, whose aim is to give efficient movements, with short journeys, using appropriate equipment, with little damage, and using special packaging and handling where needed [12] .

Package and Packaging wraps materials to make sure that they are properly protected during movements so that damage is kept to a minimum.

Logistics Communications Alongside the physical flow of materials is the associated flow of information. This links all parts of the supply chain, passing information about products, customer demand, materials, movements, schedules, stock levels, availability, problems, costs, service levels, and so on.

Company case
The research studied in a wooden furniture factory. Because the cost of wooden furniture was very high, the research objectives were to find where or which activity originated that high cost. Products chose to be studied was the most productive one; i.e. night table. The cost examined contained 10 categories and the activities were divided into 27 activities. Only inbound logistics activities were studied.

Research Methodology
Data correction
The activities flow in furniture industry was studied. The costs and the order of production activities were examind. 10 categories and 27 activities were closely examined by gathering data about the cost for one month period.

Resources identification
Four types of resources were identified as. 1. Labor cost 2. Land cost 3. Machinery cost 4. Material cost and cost identifications were calculated as followed.

Distribution of labor costs
Cost per month of salary of employee A = salary of employee A × % ratio of operational logistics of the staff's A.

Cost per month of salary of employee B = salary of employee B× % ratio of operational logistics of the staff's B.

All labor cost is the sum of the cost of all staffs involved.

Distribution of land costs
Monthly cost of land use = land cost paid per month × (land used in the operation's logistics ÷ land where the building is located)

The cost per month of building use = Land cost to pay per month × (area of the building used for logistics work ÷ all space within buildings).

Distribution of machine costs
The depreciation per month = (Price possession - depreciation deducted) ÷ number of years left ÷ 12.

Maintenance costs = Maintenance of all equipment used per year ÷ 12.

Distribution of material costs
The costs of material usage per month = Purchasing value of materials used per year ÷ 12.

Cost per month = Price per unit × consumption volume per month.

Activity-Based Costing (ABC)
Distribute four type of resources (5.2) to each activities and summation the total cost were find cost of each activities.

Logistics Cost
Divide 13 costs of logistics activities from all cost in 5.3

Conclusion
Conclude logistics cost of each activity and propose guidelines to reduce logistics cost

Result

Activities identification

Using Activity-Based Costing to calculate activities related to logistics, researchers examined the process flow of wooded furniture industry in order to find out the relationship between the function of different units related to logistics as shown in table 2

Activities in wooden furniture			
1	**Data information**	**5**	**Production process**
1.1	Purchasing	5.1	Woods section
1.2	Order received	5.2	Colours section
1.3	Finished good	5.3	Assembly section
1.4	Production ordered	**6**	**Checking process**
1.5	Product designed	6.1	Checking process
1.6	Make an invoice	**7**	**Packaging process**
2	**Receiving material**	7.1	Stock checking
2.1	Wood inspection	7.2	Packaging
2.2	Material inspection	**8**	**Transportation**
2.3	Moving the product by hand lift	8.1	Prepare product for loading
2.4	Bringing wooden to oven	8.2	Loading product
3	**Inventory management**	**9**	**Reverse logistics**
3.1	Wooden shaving	9.1	After sales service
3.2	Storing wooden on the shelf	9.2	Repairing product
3.3	Storing wooden on the floor	**10**	**Administration management**
3.4	Material inventory	10.1	Cleaning
4	**Material Handling**		
4.1	Distribute materials		
4.2	Distribute woods		

Table2. Shows all activities in wooden furniture

Table 2 shows all activities in wooded furniture factory, which can be categorized into 10 units and have 27 activities. After specifying logistics activities to be studied, the next step is to identify relevant resources

Resource identification

Resource costs of wooden furniture industry are evaluated by the following categories: material cost, machinery cost, land cost and labor cost. The costs to be calculated are costs incurred in one month. The collected data comes from the expenses of a company.

Cost type	Cash	%
Labor cost	78433.13	50.28
Land cost	43,665.13	27.99
Material cost	22,037.23	14.13
Machinery cost	11,851.31	7.60

Table3. Shows Resources identification

Table3. shows the cost of Resources identification. Labor cost was the highest value (50.28%) and land cost, material cost and machinery cost ,the value reduced accordingly.

Cost Distribution for Different Activities
Distribution of labor costs

Data information	Times	Labor	Salary(Baht)	Ratio(%)	Costs (Baht)
1.1Purchasing	3,120	1	10,000	25	2,500
1.2Order received	4,680	1	100,000	37.5	37,500
1.3Finished good	1,560	1	10,000	12.5	1,250
1.4Production ordered	130	1	100,000	1.04	1041.67
1.5Production designed	5,720	1	35,000	45.83	16041.67
1.6Make an invoice	480	1	18,000	3.85	692.31

Table4. Distribution of labor costs

Distribution of land costs

Activity	Land cost		electricity charge		Telephone bill		Internet cost		Total
	36316.96		25991.4		4323.88		1302.26		67934.5
	Ratio(%)	Costs (Baht)	Ratio(%)	Costs (Baht)	Ratio(%)	Costs (Baht)	Ratio(%)	Costs (Baht)	
Data information									
1.1Purchasing	0.17	61.01	14.30	3717.80	40.00	1729.55	40.00	520.90	6029.26
1.2Order received	0.24	87.16			60.00	2594.33	60.00	781.36	3462.84
1.3Finished good	1.82	660.31							660.31
1.4Production ordered	0.24	87.16							87.16
1.5Product designed	0.17	61.01	26.22	6815.96					6876.97
1.6Make an invoice	0.17	61.01	2.20	571.97					632.98

Table5. Distribution of land costs

Distribution of machine costs
When developed the activity cost from machine cost, the cost distributed calculated from the ratio of time the machine ran for that particular task. For example, some machines ran two activities equally, each activity cost gained from a half of machine cost.

Distribution of material costs

Data information	material	Ratio (%)	Costs (Baht)
1.1Purchasing	Office equipment	10.00%	29.20
1.2Order received	Office equipment	10.00%	29.20
1.3Finished good	Office equipment	10.00%	29.20
1.4Production ordered	Office equipment	10.00%	29.20
1.5Product designed	Office equipment	10.00%	29.20
1.6Make an invoice	Office equipment	10.00%	29.20

Table6. Distribution of material costs

Calculation of logistics activities costs
Can be done by using the ratio of cost distribution multiplied by the cost of that category. Then find the sum of all the costs resulting in activities costs.

	Activities	Resource identification				Total	Ratio %
		Labor cost	Land cost	Machinery cost	Material cost		
1	Purchasing	2500.00	6029.26	63.58	4.96	8597.80	5.51
2	Order received	37500.00	3462.84	13.12	-	40975.96	26.27
3	Finished good	1250.00	660.31	-	4.96	1915.27	1.23
4	Production ordered	1041.67	87.16	-	4.96	1133.79	0.73
5	Product designed	16041.67	6876.97	873.27	4.96	23796.87	15.26
6	Make an invoice	692.31	632.98	45.22	4.96	1375.47	0.88
7	Wood inspection	253.84	577.77	-	137.33	968.94	0.62
8	Material inspection	171.16	548.06	9.92	4.96	734.10	0.47
9	Moving the product by hand lift	15.38	858.40	2.48	-	876.27	0.56
10	Bringing wooden to oven	129.23	250.92	-	1345.72	1725.87	1.11
11	Wooden shaving	4410.00	6981.57	4433.33	2291.09	18115.99	11.61
12	Storing wooden on the shelf	588.00	247.62	921.65	-	1757.27	1.13
13	Storing wooden on the floor	575.00	779.16	-	-	1354.16	0.87
14	Material inventory	82.69	660.31	217.75	-	960.75	0.62
15	Distribute materials	541.67	31.69	52.41	-	625.77	0.40
16	Distribute woods	1365.00	148.57	131.02	-	1644.59	1.05
17	Woods section	3706.00	4832.35	4058.69	7702.15	20299.19	13.01
18	Colours section	3081.71	2212.78	787.63	4273.97	10356.09	6.64
19	Assembly section	796.85	1268.20	241.24	4869.96	7176.25	4.60
20	Checking process	1003.85	148.57	-	142.29	1294.71	0.83
21	Stock checking	112.93	277.33	-	4.96	395.22	0.25
22	Packaging	439.18	99.05	-	339.58	877.81	0.56
23	Prepare product for loading	118.27	277.33	-	-	395.60	0.25
24	Loading product	149.08	1122.52	-	-	1271.60	0.82
25	After sales service	76.07	1122.52	-	4.96	1203.55	0.77
26	Repairing product	291.58	578.74	-	663.92	1534.23	0.98
27	Cleaning	1500.00	2892.15	-	231.54	4623.69	2.96
	Total	78433.13	43665.13	11851.31	22037.23	155986.80	100.00

Table.7 Shows Cost of all activities in wooden furniture

Table 7 Shows Cost of all activities stating that order received highest value is 26.27% of the cost all activities, which is as high as 40,975.96 Baht. The second highest value is product designed, 23796.87 Baht, which is 15.26 % Costs of all activities can be presented by Pareto Chart with value 80% as shown in figure 4.

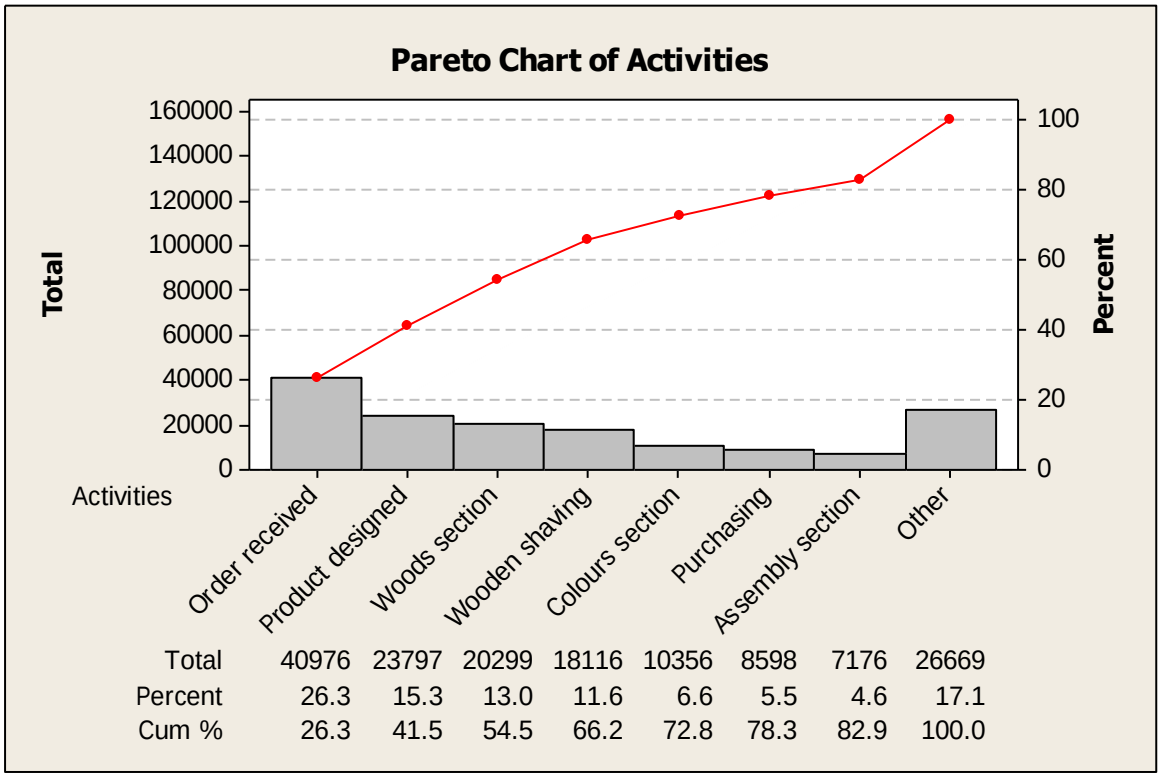

Fig.2. Shows pareto chart cost of each activities .

Gathering data costing of each activity to make Pareto Diagram as shown in fig.4.The Pareto diagram shows 80% of logistics cost that the highest cost is order received 26.27% , product designed 15.26%, woods section 13.01% wooden shaving 11.61% , colors section 6.64% , purchasing 5.51% and assembly 4.60 %

Considering 13 different logistics activities costs, we can find that 3 of them have value higher than 80% as shown in the Pareto Chart, including order received 26.27% , inventory management 11.61% and purchasing 5.51% If it is possible to decrease the cost of all 3 activities, the logistics cost of the industry will also decrease. Researcher uses industrial engineering technique to make the logistics cost lower.

Conclusion

According to the analysis of logistics cost in Wooden Furniture Industry applying the Activity-Based Costing (ABC) , the result shows that the highest logistics cost is order received 26.27% inventory management 11.61% and purchasing 5.51% of all activities in wooden industry. Researcher suggests that a way to improve logistics cost of the industry for more efficient and effective management is to use industrial engineering technique to adjust each activity such as problem of inventory management activity is formed into group by ABC Analysis and set new organization to improve working process for order received problem. Because current flow all of purchasing process was approve by top management.

Acknowledgements

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THE COOPERATION OF LOGISTICS BETWEEN EUROPEAN COUNTRIES AS THESE EXPERIENCES FOR SOUTH EAST COUNTRIES WHEN IT COMES TO THE ESTABLISHMENT OF ASEAN ECONOMIC COMMUNITY

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Abstracts
The call paper is specialized into logistics cooperation activities in European countries, which is put in the situation of establishment of ASEAN Economy Community, particularly South East countries. This will be considered as the experience in managing by government officers as well as the Board management of Logistics. The group author"s methodology is almost used by descriptive, theoretical analyses. In addition, conducting information - related survey and in - deep interviews by expert will be considered in case of necessary. This call paper will focus on Logistic Corporation leading to result in some benefits including bringing on effective in transportation, cut cost and save time, improving the transportation connectivity among countries in ASEAN area, facilitating the construction of infrastructure and legal framework assisting to develop regional logistic activity. In this research, authors focus on analyzing in the period before and after 2015, it attempted to investigate the turning point in the installment of ASEAN Economy Community, including 10 countries with the signed print by the Prime Minister in these nations. For future research it is suggested that the cooperation is worth taking into consideration as the innovation related to management activities in microscopes (inside business) as well as macro scopes (countries) in logistics sector. Furthermore, lessons from the success of the European market is the basis foundation for the ASEAN Economic Community in setting up a common market in the field of logistics, shortening time to avoid mistakes and making the intended plan more possible to develop regional logistic activity. Logistic cooperation among nations has played an important and critical role in formation and development of country collaboration; create the efficiency and capacity of trade among nations of region. Consequently, this paper can provide valuable pointers for shaping AEC.

Key Words:: Cooperation of logistics, ASEAN Economy Community, European countries

Classification: Research paper

Concepts of logistics and logistics cooperation

Logistics is a key ingredient in integrating trade and business. Traditionally, logistics is understood as a management concept that is implemented and managed at the firm level. For example, Council of Logistics Management (1998) defines logistics as a part of the supply chain process that plans, implements, and controls the efficient, effective forward - reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Nevertheless, logistics encompasses not only the physical movement of goods, but also the facilitation of movement through the processing of documents, coordination among participants, monitoring of activities, and financing of transactions. Thus, at present, governments have recognized the importance of logistics as a macro-level system that encompasses all stakeholders is needed to develop regional and national logistics development policy. According to Asian Development Bank (ADB) (2010), such logistics system should consist of 4 main factors: (1) Shippers, traders, and consignees; (2) Service providers; (3) Institutional framework; (4) Infrastructure.

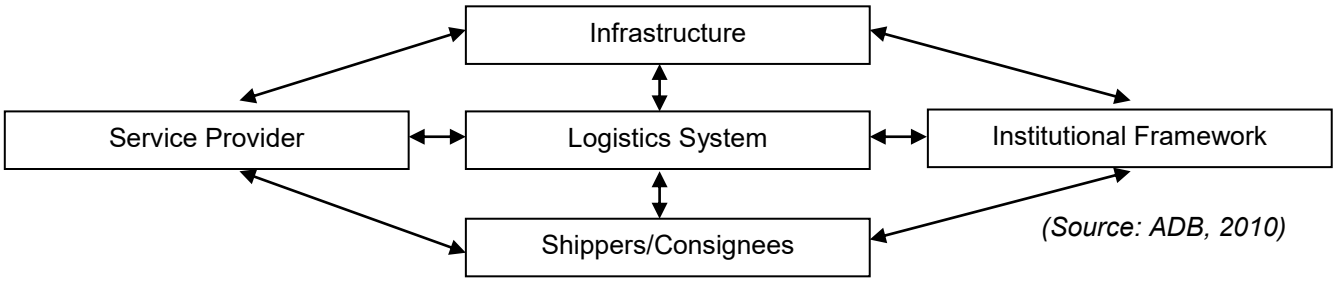

Chart 1: Macro-logistics system dimensions

Shippers, traders and consignees and service providers are referred as the private sector; on the other hand, infrastructure and the institutional framework are managed by the national governments and regional institutions. On the other hand, regarding economic connectivity, three dimensions are mentioned, institutional connectivity, physical infrastructure connectivity and people to people connectivity. Since people connectivity mainly includes tourism, education and culture, logistics cooperation is more related to institutional connectivity, physical infrastructure connectivity. Therefore, from both perspectives, regarding regional logistics cooperation in this paper, we refer to the corporation in the *institutional framework* and *physical infrastructure* in particular.

Situation of Cooperation in logistics sector among EU countries

Institutional framework

Institutional connectivity refers to linking various international or regional agreements and protocols to harmonize and simplify cross-border procedures as well as facilitate transport.

First of all, about cross-border procedures, cumbersome trade documentation and procedures can be a problem to intra-community trade as well as trade with third countries. All members of the EU formed the European Customs Union early in 1990 which imposes unified customs arrangements and allows all goods, whether made in the EU or imported, circulate freely under Common/Community transit and the International Road Transport Convention. For the goods cross internal borders of member states, no customs formalities are required; which bolsters intra-EU trade (dispatches and arrivals) which represents around 65% of the total trade of the member states and up to 80% of the total imports or exports of some countries (Moussis, 2002). Nevertheless, under current rules, territorial waters are considered as the EU's external borders. Therefore, the EU Commission has proposed a Blue Belt package to reduce unnecessary administrative burden for the maritime industry with the introduction of eManifest which will allow for proving the EU or non-EU status of goods and ease customs formalities for intra-EU shipping. In addition, to simplify the customs procedures, the EU custom union is constantly working on (i) updating and automating procedures and (ii) the centralization and easier access to simplified procedures. As a part of pan-European e-Government services, in July 2003, they decided to resort to a paperless environment for customs and trade with integrated electronic customs systems for the exchange of data (European Commission, 2014). Now, a vast majority of customs declarations for both import and export are submitted to customs electronically; the global EU level of electronic input is more than 98% (European Commission, 2012). In addition, simplified customs procedures are a key element of EU customs policy. Traders who are authorized to use these procedures benefit from an accelerated customs clearance process such as incomplete declaration, simplified declaration and local clearance, with the result that they have the goods at their disposal more quickly. According to European Commission (2012), 78% of all imports and 71% of all exports are made using simplified procedures. These simplified procedures are supported by Single Authorization for simplified procedures (SASP) or Centralized Clearance and the recognition of Authorized Economic Operator (AEO). SASP enables an economic operator to centralize the accounting and payment of customs duties for all his/her transactions in the member state where he/she is established, regardless of the place where the movement of goods occurs. The physical control and release of goods may take place in another Member State. On the other hand, to avoid the adverse impacts of some security measures, AEO status has been introduced to put enterprises in stronger position to benefit from simplified procedures. The AEO status granted by one Member State is

recognized by the other Member States and Member States should grant the use of simplifications to AEO if they meet specific requirements and without re-examining criteria that have been already checked.

Furthermore, the transport facilitation is supported by a number of legislations to harmonize the transport policy in EU such as the single multimodal transport documents, Single European Sky, the consistent road user charges, social and safety legislation, transposition and enforcement of legislation in the member states.

Physical infrastructure

Physical connectivity in logistics cooperation mainly encompasses hard infrastructure in transport.Well-developed infrastructure reduces the effect of distance between regions, integrates the national market and connects it to markets in other countries and regions. Overall, the infrastructure of EU state members is well-developed; however, as illustrated with the competitive index 2013-2014 (World Economic Forum, 2014), some have outstanding quality of infrastructure like Germany, France, Netherlands and United Kingdom at the top 10 while that of others like Bulgaria, Poland and Romania is below the world"s average level. Therefore, besides the development of individual member; the transport policy of EU these days is designed in favor of more coordination and the harmonization of regulations and physical transport systems. About the disparity among member states, not all countries can be logistics hub for international distribution but thanks to the free circulation of goods within EU, products can leave or enter the continent transit through the “Blue Banana” cities which are strategically located at the economic heart of Europe including Netherlands, Belgium, Western and Southern Germany down to Switzerland and Northern Italy (Colliers International, 2013). These cities all have developed infrastructure network with Europe"s largest freight airports and seaports, which function as gateways towards non-EU markets. Second, in early 1990s, the policy has shifted towards a balance with development of integrated transport systems and the development of transport infrastructure for the purpose of strengthening economic and social cohesion so as to reduce disparities between the regions (Giorgi and Schmidt, 2002). That later on led to the birth of the trans-European Networks (TEN) in 1996 with Decision No 1692/96/EC (PLANCO Consulting GmbH, 2003). Due to the tendency of shifting from nationally based manufacturing to pan-European systems (Piecyk and McKinnon, 2010), the gaps between Member States' transport networks and the technical barriers such as incompatible standards for railway traffic (European Commission, 2014), a network connecting the continent between East and West, North and South is essential. Regarding the financing scheme, although national budget are still the main source of finance; member states have resorted to other source of funds like European Investment Bank, Ten-T, cohesion fund, European Development fund. Among these other sources, cohesion fund accounts for the largest part. Cohesion fund is formed by the contribution of member states; it is also the evidence of benefits caused by integration. A study has found that Germany, one of the European Union's largest fund contributors, is also the top indirect beneficiary from payments to four Central European member states when each euro that Germany pays into EU cohesion funds generates 1.25 euros (1.66 dollars) in revenues from exports to those states (EU Business, 2012). In addition, Ten-T is the next large other source with the PPP (Public Private Partnerships) arrangements based on the procurement of services. Direct funding support for PPPs was made available for the first time in the 2010 TEN-T Annual Call for Proposals. Although PPP is still new with not large contribution to the projects at the moment, with large and complex projects, the European Commission remains committed to ”explore the opportunities that can come from a greater involvement of the private sector” (European PPP Expertise Centre, 2003).

Suggestions on boosting the integration in logistics sector among ASEAN members from European experiences

Cooperation in logistics in AEC

As can be seen in AEC blueprint in 2008, AEC"s move to 2015 is quite similar to that of EU. First, about institutional framework, AEC aims to (i) customs integration and (ii) single market in transport sector. The customs integration in AEC is accelerated with simple and harmonized customs procedures and formalities, ASEAN Customs Transit system, ASEAN e-Customs, Mutual Recognition Arrangements and a uniform system of tariff classification. Particularly, the ASEAN Framework Agreement on Goods in Transit is one of major agreement; it was proposed in 1998 but nine protocols forming integral parts of this Agreement have not all finalized, signed and ratified. Recently, in 2013, an important parts, Protocol 7 - Customs Transit System was signed by all ASEAN members except Thailand and the Philippines.

Nevertheless, this agreement covers the transit of land transport including road and rail transport only. On the other hand, Single Window will be developed as an environment where ten National Single Windows of individual Member Countries operate and integrate. National Single Window enables a single submission of data and information, a single and synchronous processing of data and information and a single decision-making for customs clearance of cargo, which expedites the customs clearance, reduce transaction time and costs, and thus enhance trade efficiency and competitiveness. In addition, ASEAN has introduced a number of transport facilitation initiatives over the years to create an efficient logistics and multimodal transport system to connect land, maritime, and air transport such as ASEAN Framework Agreement on Multimodal Transport, ASEAN Framework Agreement on the Facilitation of Inter-State Transport, Roadmap for Integration of Air Travel Sector and Roadmap Towards an Integrated and Competitive Maritime Transport in ASEAN. It is notable that the transport facilitation does not only encompass the seamless transport route like the ASEAN Open Sky Policy; it can be reflected by the liberalization of the maritime and air transport sector which should lead to competitions and subsequent lower costs and increased quality of services and timeliness.

Second, regarding physical infrastructure development, integrated transport network has been implemented to connect ASEAN members as well as ASEAN with the neighboring Northeast and South Asian countries. Specifically, under AEC blueprint, ASEAN Highways and Singapore-Kunming Rail Link are the priority projects. ASEAN Highways is an expansion of the „Trans-Asian Highway" network within ASEAN; both cover all member states in ASEAN. Singapore-Kunming Rail Link only covers several routes in mainland Southeast Asia through Singapore– Malaysia–Thailand–Cambodia–Viet Nam–China (Kunming) and spurs lines in Thailand–Myanmar and Thailand–Lao PDR. Nevertheless, these projects still cannot bridge the mainland Southeast Asia and the island Southeast Asia; for examples, the Philippines, as an island Southeast Asia country, does not share its border and has no highway or railway linkages with any other ASEAN countries. As regard infrastructure financing, The ASEAN Infrastructure Fund was established as a corporate entity wholly owned by government and the ADB and issue bonds for additional funding; with projected 70% co-financing by ADB, the Fund plans to leverage more than $13 billion in infrastructure financing by 2020 (ADB, 2012).

The logistics cooperation in AEC is the continual and more comprehensive efforts from ASEAN agreements and projects such as the agreement in customs and transport or the ASEAN Highways with a ministerial understanding in 1999 and Singapore-Kunming Rail Link initiated in 2006. On the other hand, AEC seem to be a further step toward a more integrated and interdependent ASEAN when pursuing deeper integration of markets and production systems. For example, the implementation of ASEAN Single Window or Mutual Recognition Arrangements or a more an ASEAN Single Shipping Market requires more national adjustment beyond trade liberalization.

Similarities and dissimilarities between EU and AEC

Regarding logistics, AEC and EU are similar in (i) the disparity in development level of member states,(ii) the share of inland transport, (iii) the objective of a single market with free movement of goods and improvement of the regional competitiveness. These similarities will be the ground for further move of AEC. First, both AEC and EU are handling with the development gap among member states which including the difference in infrastructure quality and incompatible standards. Second, although ASEAN"s geographical location is more diversified with the sea area of about three times larger than its land counterpart (ASEAN Financial Institution Conference, 2014), inland transportation is the main mode in term of shares of intra-ASEAN merchandise trade values (Meyrick, 2005). That was similar to the situation of EU when more than a half of intra-EU goods transport is road in 2010 (European Union, 2012b). Third, the AEC and EU both share the spirit of the economic integration with the simplification, harmonization in trade and customs. In addition, as mentioned above, both AEC and EU have been very active in developing the regional integrated network transportation.

Nevertheless, despite the resemblances mentioned above, AEC and EU are dissimilar in (i) the main driving force of economic integration, (ii) institutional structures, (iii) the external policy and (iv) geographic diversity and national advantages. First, intra ASEAN trade is only about one fourth its global trades while in the case of EU, it is two thirds (Hamada, Resza and Volz, 2009).Thus, it is suggested that EU is a large economic space with developed economies with high consumption and production volume. ASEAN and

AEC"s commitments should be more investment agreements than trade agreements or focus on single production base rather than the single market. It is reasonable when parts and components and final assembled products accounted for 66.1% of ASEAN exports and 64.0% of ASEAN imports in 2006-2007 (Asian Development Bank Institute, 2013). Moreover, it is supportive of Asia"s new growth model of a regional production hub and increasing intraregional trade, 70% of intra-East Asian trade comprises trade in parts and components which are then assembled into final goods and exported to other countries, particularly the United States and the EU (ADB, 2007). This pan-ASEAN production base is most apparent in the electronics and automotive sectors which have long value chains (Asian Development Bank Institute, 2013). Hence, in that manner, AEC is more open globally integrated or more "outward looking" (ASEAN, 2008) and free circular of goods will attract more FDI as a vertical integrated market. Second, while EU focuses on the pooling of sovereignty for common gains with supranational policy-making bodies like the European Central Bank or the European Commission, AEC respects of national sovereignties of each member state and makes decision based on consultation and consensus (Chairasmisak, 2012). Besides, the rotation of ASEAN chairmanship every five years may expose ASEAN to the leadership problem; more specifically, a series of officials from the poorer, less developed ASEAN countries will be the chair of ASEAN for the next few years means that leadership will be inexperienced and possibly be less interested in pushing ahead quickly with integration on all fronts. Third, despite the common policy on intra-community trade, at present, AEC is not a customs union with the different external policy; that implies the possible competition among countries and may disrupt the process for single market. Fourth, the competitive advantages and income level of most ASEAN countries rather resemble each other; except for Singapore and Brunei, others are developing countries which emphasize exports and foreign investment and likely to compete for inbound investment and jobs (Runckel, 2012). In addition, geographically, ASEAN can be divided into mainland and island countries; such geographical diversity of ASEAN countries also makes it hard to foster the connectivity and interdependence among nations. Consequently, in addition to the regional disparity and competition, the lack of leadership and the entity for implementation and enforcement of such economic community may slow the integration process including the logistics cooperation (Runckel, 2012). Additionally, the weaker integration and interdependence and the lower level of development of some member states may also cause the problem in infrastructure financing.

Policy implications for AEC

If all countries in the ASEAN were to improve border efficiency and infrastructure to half the level of Singapore, then exports from Southeast Asia would increase by around 12% and regional GDP would increase by more than 9% (Bain & Company and the World Bank, 2013). That shows the necessity of logistics improvement of ASEAN countries. This paper will not focus on the fundamental issue of AEC such as basic principle of decision-making in ASEAN of consultation and consensus or its institutional structure because it seems that "the AEC is not, and has no intention of transforming ASEAN into a European style union" (Trairatvorakul, 2011). Instead, it proposed some measures to enhance the institutional and physical infrastructure in logistics cooperation under the current ASEAN scheme.

Cross border procedure simplification and harmonization for both intra ASEAN trade and trade with third countries

As for cross border procedure harmonization toward intra ASEAN trade, it appears that the ASEAN governments have exert a number of efforts to streamline the procedure for goods transit of intra-ASEAN trade. On the other hand, the objective of single market and production base with would be not possible without more harmonized policy toward outside trade even if it means that certain sovereignties may be given up. Since ASEAN is more outward looking with the large share of trade with non ASEAN countries, this streamlines will increase the competitiveness of the region. In addition, harmonization would not be sufficient for an effective policy. It is recommended that ASEAN should follow the pattern of EU with the application of incomplete declaration, simplified declaration and local clearance or Single Authorization for simplified procedures or Centralized Clearance or the recognition of Authorized Economic Operator as discussed above.

Promote the rail and the maritime transport

As illustrated in Chart 2, the intra-ASEAN trade is mostly between ASEAN mainland countries; the trade between ASEAN mainland and ASEAN islands or between ASEAN mainland countries is not significant. It

may be due to the missing link between ASEAN islands and ASEAN mainland. Particularly, as for the Philippines; it is an important location in ASEAN single production base with the Parts & components export of 71.7% and import of 61.3% in 2006-2007 (Asian Development Bank Institute, 2013) but has no highways or railways link in physical infrastructure projects on ASEAN . Thus, a harmonized and simplified port procedure will better facilitate and foster intra-trade of ASEAN, particularly the trade between ASEAN islands and ASEAN mainland and among ASEAN islands as well as develop single production base in ASEAN. In addition, concerning goods transit agreement, it seems that AEC has not covered the goods movement from one port to another in ASEAN. Therefore, to promote the single market and production base, port facility as well as procedure should be improved; it can follows the Blue Belt package of EU as mentioned above. Since a vast majority of containers has mixed cargo, it will require the application of a system for proving the community or non-community status of goods (eManifest in EU); any community goods on board do not need customs supervision in order to speeding up of customs procedures for such cargo.

Chart 2: Trade Volume among ASEAN member state
Source: ERIA Study Team, 2010)

Considering the fact that land transport is the main mode in ASEAN, rail should also be given the adequate priority. Rail transport is less costly in environmental terms than road transport and may offer a competitive alternative to the latter on certain major segments of the market (European Commission, 2007). The recent policy on EU rail freight development has shifted the land transport from road to rail mode; they even raise the road fee to encourage the use of rail freight. The rail and maritime transport not only help ASEAN to fully recognize its potential as a single market and production base; it also reduces the impact of transport on global warming and energy shortage which is the problems that ASEAN, EU and other economies are now facing.

Transport mode	Approx. relative energy consumed per freight ton	Approx. relative carbon (CO_2) emission per freight ton
Ship	1	1
Railway	3	2.5
Truck	3	6
Aircraft	120	60

Table 1: Comparison of Transport Mode
(Source: ERIA Study Team, 2010)

Financing infrastructure with cohesion fund and PPP proposal

Cohesion fund in ASEAN has been considered for a long time; but the low level of overall income compared to EU and the reluctance of ASEAN leaders has deterred the process. ASEAN have large economic powerhouses such as Singapore, Thailand or Malaysia like EU with Germany and France while Laos and Cambodia are struggling with infrastructure finance. The cohesion fund is believed to benefit both the contributors and the receivers like the case of Germany and four to four Central European member states above said. The need for a cohesion fund is more intense considering the fact that for Laos, the finance source of the Singapore-Kunming railway will be a loan from China nearly which is as big as Laos"s formal economy (T.J., 2013). The cohesion fund is one step to a more interdependent ASEAN to bridge the gap among its member states and most importantly, to reduce the dependence on the outside. In addition, for such large infrastructure project, PPP can be considered as a potential option. On one hand, it is additional finance source to national budgets; on the other hand, it reduces the dependent of foreign loan like the case of Laos. Nevertheless, PPPs require more detailed project preparation in order to achieve appropriate risk sharing with the private sector. In the case of ASEAN, it needs a joint efforts and programs like the TEN-T annual call for proposal in EU for the sake of the overall region.

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A STUDY OF LOGISTICS PERFORMANCE OF MANUFACTURING AND IMPORT- EXPORT FIRMS IN VIETNAM[1]

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ABSTRACT

Purpose: Logistics performance assessment is a critical issue when trying to improve logistics. This is particularly true in developing countries where no baseline survey has been done on the subject. This research explored and analysed logistics performance of manufacturing as well as export-import trading firms in Vietnam.

Methodology/design/approach: The framework for the logistics performance assessment is based on the tool developed by Banomyong and Supatn (2011). The framework is derived from the 9 key logistics activities proposed by Grant et al (2006). In order to measure firm logistics performance, three performance dimensions are used: cost, time and reliability. A survey was conducted to obtain Vietnamese logistics related data.

Findings: This is the first research in Vietnam that shows firms' logistics performance through the use of such an assessment framework. The instrument was relatively simple and easy to apply and understand. In addition, based on the research results, the paper provides recommendations and solutions that encompass a series of policies to effectively reduce the prevalent logistics costs of firms in Vietnam.

Research limitations/implications: Limitation is related to the availability of the required assessment data. The availability data is a reflection of systematic data collection and storage procedures of the respondent firms. The inadequate understandings related to logistics have made respondents confused when trying to answer the questionnaire.

Originality/value: The tool used in the research is precise and simple enough for firms to apply. Proposed solutions and recommendations can be considered as reliable practical for enterprises in Vietnam in a common effort to reduce logistics costs and increase competitive capabilities. This is the first survey of this kind in the country.

Keywords: logistics cost, logistics performance, cost, time, reliability, manufacturing and import-export firms, Vietnam.

[1] The authors would like to acknowledge the work done by Paitoon Varadejsatitwong in the initial analysis of the data.

Introduction

Over the past 20years, Vietnam has achieved a sustained economic growth. According to the World Bank (WB), one of the most important factors to maintain that achievement was the labour migration trend from rural area to urban area, causing a decline labour market shortage and leading to improvement of productivity as a priority in the next phase of Vietnam's economic development. Vietnam has benefited from favourable geographical location, political stability as well as impressive investment in infrastructures, which are the key conditions for the rapid development of industry, an increase in trade and stronger global connectivity. However, the WB also indicated that Vietnam's key challenge is to sustain economic growth through within-sector productivity improvements. Better performing logistics can play a significant role in increasing productivity, as well as provide international and domestic investors with an environment where they can source products for export at a lower total landed cost than what they incur in other countries.

However national logistics cost in Vietnam lies in the range of 20.9 to 25% of GDP (Blancas *et al.,* 2014), 10% higher than the average for developing countries in the region. In addition, logistics services in Vietnam are not only costly but also less effective. In 2012, the inventory costs nationwide due to delays in customs procedures amounted to US$100 million and have been estimated to go up to US$121 million in 2015 and US$182 million in 2020. The problem with these numbers is that they are national estimates and does not reflect the actual situation at sector or firm level.

Logistics performance assessment is a critical issue when trying to improve logistics. This is particularly true in developing countries where no baseline survey has been done on the subject. The purpose of this research is to explore and analyse logistics performance of manufacturing as well as export-import trading firms in Vietnam. This will enable the country to have an initial logistics performance baseline.

This paper is structured into four sections. First, an overview of development of manufacturing and export- import enterprises in Vietnam is presented. The literature review on logistics performance and determinants affect logistics cost of firms is then discussed. In the third part, the methodology section explains the data collection and the framework for logistics performance assessment. Finally, the findings from the study is further presented and explained. The recommendations regarding a set of measures for promoting logistics performance of Vietnamese firms are then derived.

Overview of manufacturing and export-import firms in Vietnam

Vietnam's manufacturing and export-importsector grew at a compound annual growth rate (CAGR) of 9.3% from 2005 to 2010, and labor productivity in the sector increased at 3.1% a year. Because this sector accounts for around 30% of overall GDP, this rapid growth made a substantial contribution to Vietnam's expansion during the said period. Within manufacturing, some subsectors performed especially well. Automotive production grew at an annual rate of 16% during these five years, ready-made clothes by 12.9%, and electrical equipment by 12%.

The manufacturing and export-importindustry plays a vital role in Vietnam's economy by providing employment opportunities and accelerating growth. Simultaneously, liberalisation, removal of investment restrictions, and semi-privatization of the economy have greatly boosted the country's industrial growth rate. The main manufacturing and export-import sectors in Vietnam are textiles and garments, food and beverages, leather and wood. The Government has implemented various programs to transform Vietnam's economic structure from agriculture-driven to industry-driven and reduce its import dependency. The development of export processing and industrial zones is just one of the initiatives that bolstered the country's industrial growth. The Government has also offered incentives to investors in social sectors such as health and education. However, since liberalisation, the Governments share in the overall industrial investment has been declining, thereby enabling higher participation of private and foreign companies.

Overall, with an aim to become industrialized country by 2020, Vietnam's manufacturing and export-importindustry has been undergoing major changes as a result of government initiatives, WTO commitments and industrial liberalization. Industrial development strategy for the period 2011-2020 to focus on the development of textiles, leather, chemicals, agro processing, electronics, automotive, information and communications technologies are expected benefit from the industrial development strategy. Due to improving business climate, increased trade and investment cooperation, low labour cost and Vietnam is expected to emerge as a major manufacturing hub in the ASEAN region. Hence,

the vitalization of firms in this industry is very important for the growth of the country. However, there are no data related to their logistics performance and how it can affect their competitiveness.

Literature review

According to Bagchi*, et al.,* (2000), logistics performance "is the evaluation of the effectiveness of logisticsactivities from the point of view of efficiency (compliance with the consumer requirements), and economical operation (economical nature of the utilisation of resources associated with a given service quality)". The quantification, i.e. measurement of logistics performance is based essentially on financial indicators, and several methods are used for it from activity-based costing (ABC method) through the logistics scoreboard method to the supply chain models. Halley and Guilhon (1997), stated that the logistics performance of manufacturing and trading businesses can be examined from several aspects:

- from the point of view of (external) financial indicators (e.g. transportation costs, stock turnover) it is relatively underdeveloped and reactive,
- from the point of view of organizational indicators, it is a developing activity, through the value-creation indicators it appears as a proactive activity affecting the competencies which extends the control of the owner/manager.

For the sake of the continuous improvement of the logistics processes, Bagchi and Virum (2000) analyzed the logistics performance of Norwegian SMEs, and their main findings were the following:

- The total response cycle time consisting of the time from ordering to acceptance of goods from the supplier, length of time in raw material stock, length of time in production, length of time in finished goods stock, time from customer order to receipt of finished goods and to bill payment ranged from 81-584 days, with high variance within the industry.
- As for the improvement of the logistics management processes, special attention was paid to setting customer service objectives and to organizing the improvement of the logistics processes. Contrary to the researchers' expectations, the fish processing and textile companies managed their logistics well.
- The effect on return on total assets was explained decisively by the reduction of total logistics costs and of time spent on the logistics processes, the organizing for the improvement of logistics processes and the setting goals for customer service.

In 2011, Banomyong and Supatn have developed a tool to assess logistics performance based on the 9 key logistics activities proposed by Grant *et al*. (2006). The framework includes the following logistics activities:

- Customer service and support,
- Demand forecasting and planning,
- Purchasing and procurement,
- Inventory management,
- Order processing and logistics communications,
- Material handling and packaging,
- Transportation,
- Facilities site selection, warehousing and storage,
- Return goods handling and reverse logistics.

The literature related to logistics performance measurement indicated the following shortcomings:

1. Most firms do not comprehensively measure logistics performance,
2. Even the best performing firms fail to realize their productivity and service potential available from logistics performance measurement, and
3. Logistics competency will increasingly be viewed as acompetitive differential or and a key strategic resource for the firm.

According to the literature, there are three major reasons why firms need to measure their logistics performance. They are to (1) reduce their operating costs, (2) drive their revenue growth, and (3) enhance their shareholder value.

The measurement of operating costs can help to identify whether and where to make operational changes to control expenses and to discover areas for improved asset management. This will enable firms to attract and retain valuable customers with a price/value of products offered can be enhanced through cost reductions and service improvements in logistics activities.

Methodology

In order to measure firms' logistics performance of enterprises, a framework based on the tool developed by Banomyong and Supatn (2011) is utilised. The framework is derived from the 9 key logistics activities proposed by Grant *et al.* (2006) with three performance dimensions are used: cost, time and reliability.

Logistics activities	Cost	Time	Reliability
Customer service and support	Ratio of customer service cost per sale	Average order cycle time	Delivery In Full On Time (DIFOT)
Purchasing and procurement	Ratio of procurement cost per sale	Average procurement cycle time	Supplier in full and on-time rate
Information processing	Ratio of information processing cost per sale	Average order processing cycle time	Order accuracy date
Transportation	Ratio of transportation cost per sale	Average delivery cycle time	Delivery In Full On Time (DIFOT)
Warehousing and site selection	Ratio of warehousing cost per sale	Average inventory cycle time	Inventory accuracy
Demand planning and forecasting	Ratio of forecasting cost per sale	Average forecast period	Forecast Accuracy date
Inventory management	Ratio of inventory carrying cost per sale	Average inventory day	Inventory out of stock rate
Material handling and packaging	Ratio of value damaged per sale	Average material handling and packaging	Damage rate
Reversed logistics	Ratio of returned goods value per sale	Average cycle time for customer return	Rate of returns goods

Table 1: KPI Logistics assessment framework

Source: Banomyong, R. and Supatn, N. (2011) - Developing a supply chain performance tool for SMEs in Thailand, Supply chain management: an international journal, volume 16, 2011, p.20-31

A five page questionnaire based-survey was made in order to measure logistics performance based on the 9 KPI logisticsassessment framework proposed in Table 1. The questionnaire also assessed firm's characteristics and human resource capability. The participating companies were drawn from textiles, food and beverage, electrical and mechanical engineering, automobile and plastics and chemical industries. They had from 5 to about 500 employees. The annual sales of these companies varied between VND 1-50 billion (US $ 0.05 to 2.5 million). The respondents were managers and/or senior staffs of their firms. These managers/senior staffs generally had over five-year experience in the field and held responsible positions in their organizations. Thus, their responses can be taken as representative of their firms.

53 of the companies are located in the North, 24 in the Middle and 82 in the South of Vietnam. Most of the manufacturing companies are export-oriented and have large share of exports. All data was sent back to the researchers via fax, email, postal, and even face to face interview. The participating companies commented that they had several difficulties in understanding the data requirement in the questionnaire. Furthermore, many did not have the required data available, in particular cost related data for all logistics activities.

This fact indicated that the knowledge related to logistics of Vietnamese companies is limited and that many respondents did not have an adequate understanding of logistics activities, logistics cost as well as the importance of assessing the performance of their logistics. Even though the objective of the survey was clear to the researchers there was a gap in the understanding of the respondents. In

case of lack of data or understanding, the respondents could contact the research team based in Vietnam for more explanation[2].

Findings & Recommendations

The survey asked respondents to initially state the rationale behind the estimated high cost of logistics in Vietnam. It is interesting to note that in Vietnam the understanding of logistics cost is focused very much on transportation issues. The majority of respondents also struggle to understand the importance of logistics cost as illustrated in Table 2. Nonetheless over half also highlighted the lack of transparency in the supply chain as a contributing factor to high logistics cost.

Reasons	Percentage (%)
Unawareness of logistics costs significance	63.5
Lack of transparency in supply chain	54.08
Inadequate management of distribution channel and warehouses	49.05
Poor and insufficient infrastructure	44.02
Unavailability of competent staff and professionals	38.36

Table 2: Reason for high logistics cost in Vietnamese firms
Source: The survey done by project team in Vietnam

The importance of transport cost is not surprising as this cost dimension has the highest logistics cost ratio with a cost range from 5.02% to 10.86% per sales, depending on different types of enterprises. Inventory carrying cost is at the second important cost dimension in companies' logistics operation cost. It varies from 2.28% to 6.08% per sales with an average of 4.06%. Warehousing cost accounted for 2.86% per sales by average with a range from 1.71% to 5.33%. Figure 1 graphically provides information related to respondents' logistics costs.

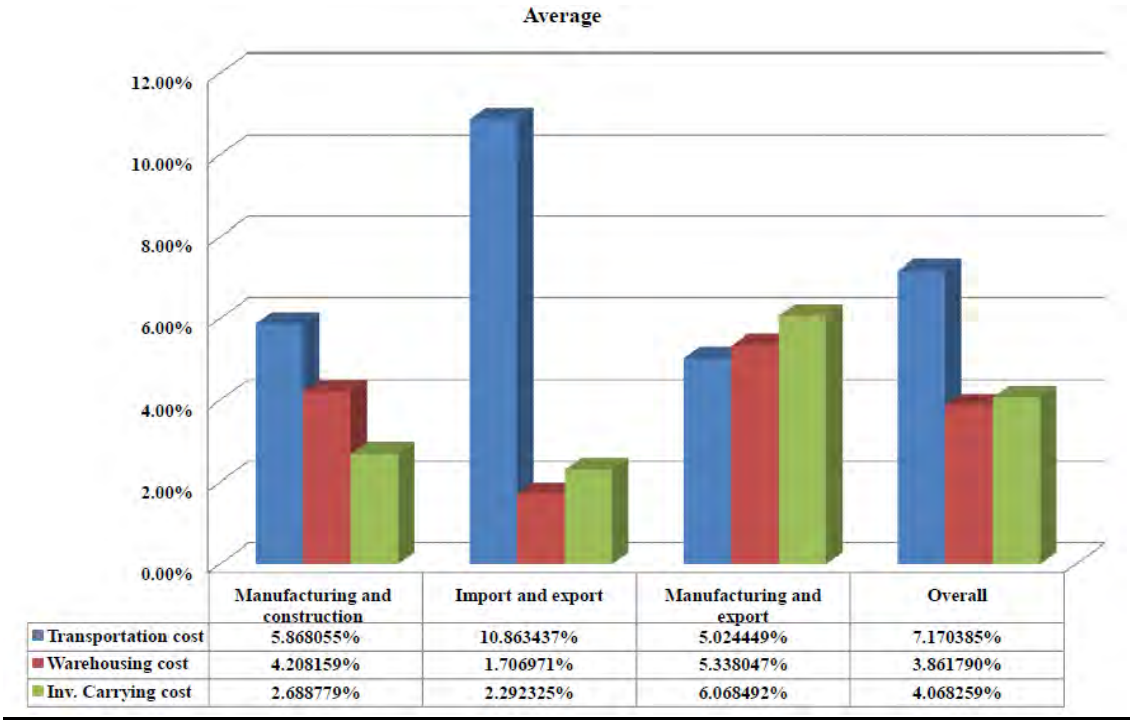
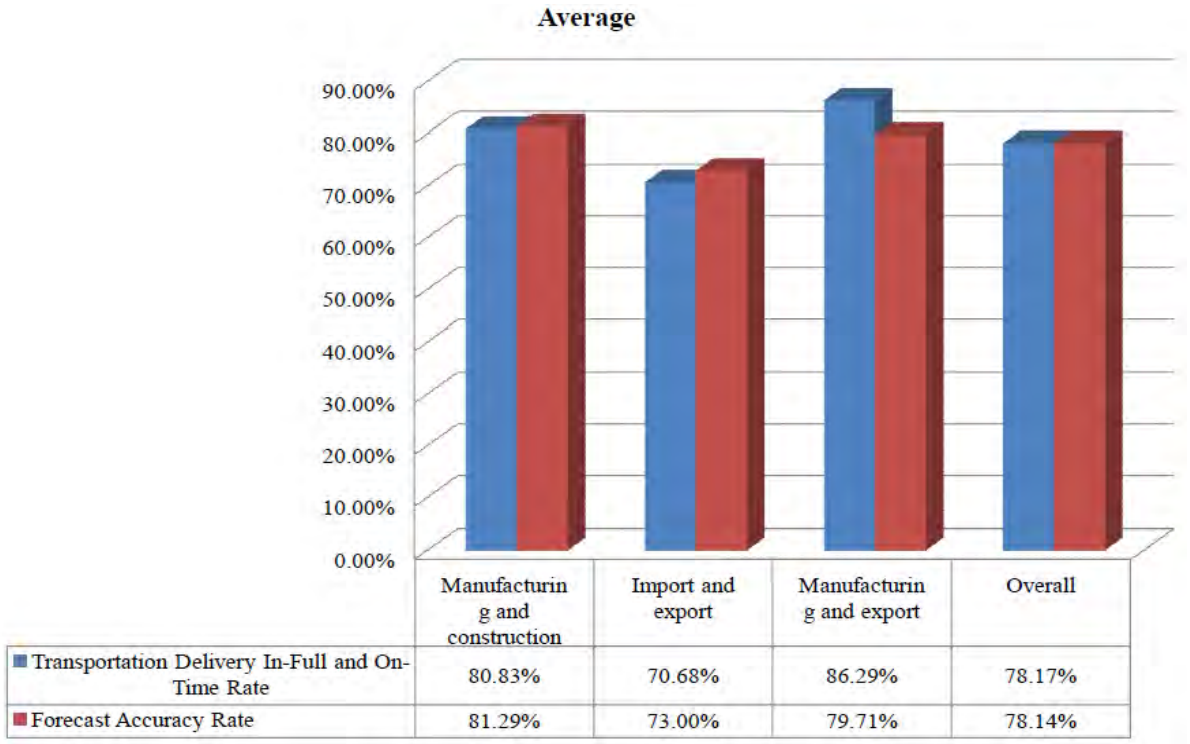


Figure 1: Average respondents' logistics costs
Source: the authors

[2]This joint research project is conducted by Foreign Trade University of Vietnam and Thammasat University of Thailand in an effort to measure logistics performance and cost in Vietnam at firm level.

With regards to overall logistics performance, most of the respondents' realised the importance of logistics in their operation. However, many of them are not aware of the role of logistics as a key source of competitive advantage and/or a top management priority in their activities. Logistics is one of the important factors that have major impact in their profitability as well as customer service level.

This issue is reflected in Figure 2. Figure 2 reflects the capability of respondents when delivering goods to their respective customers as well as how accurate is their forecast. The delivery in full and on time (DIFOT) capability is very important when trying to understand logistics performance and answering customer service level. When compared with international standards, the DIFOT capability of Vietnamese firms is quite low. The answer may be found in Table 1 which highlights numerous reasons behind not only high logistics cost but also limited logistics performance. Lack of logistics related infrastructure, know-how and regulatory transparency negatively impacts firms' logistics performance which in turns increase their logistics cost.



	Manufacturing and construction	Import and export	Manufacturing and export	Overall
Transportation Delivery In-Full and On-Time Rate	80.83%	70.68%	86.29%	78.17%
Forecast Accuracy Rate	81.29%	73.00%	79.71%	78.14%

Figure 2: Respondents' DIFOT and forecast accuracy

Source: The authors

The result also showed the external operational conditions that firms face in its domestic locations in terms of general business perspective, availability of production and business facilities, logistics efficiency, transport infrastructure, and location of competitors can have impact on their logistics performance. Based on the result and analysis, some recommendations could be made in order to improve the logistics performance of manufacturing and export- import firms in Vietnam.

Firstly, there is an urgent need to develop and increase the awareness related to the role of logistics and logistics cost in firms' operation. It is also necessary to encourage manufacturing and export-import enterprises to raise the efficiency on logistics management by reducing non-value-added activities.

Secondly, continuous investments in logistics infrastructure need to be conducted from a macro perspective in order to create an enabling environment for improved logistics. However, the investment should not only be limited to transportation infrastructure but also in other dimensions such as the institutional framework and the promotion of logistics service standards that could be offered by local logistics service providers.

Thirdly, considering from the Vietnam's logistics industry perspective in general and manufacturing and export-import firms in particular, priorities should be given to investment in human resources development in terms of providing necessary skills for all levels of authorities and enterprises.

Finally, since logistics is a crucial part of supply chain management (SCM), there is a need to develop and implement total supply chain management for those firms, leading to benefits for entrepreneurs in increasing the efficiency of production, planning, monitoring and evaluation. It also benefits to government sector in order to support the manufacturing and trading industry growth, helping them to efficiently face with changes in domestic and global market.

Even though the above recommendations have been proposed, it still need more examination before they can be of any practical value.Limitation of this research is related to the completeness of the required assessment data. The availability of data is a reflection of systematic data collection and storage procedures of the respondents' firms. This is something that is still lacking very much in Vietnam. The inadequate understandings related to logistics have made respondents confused when trying to answer the questionnaire.Thus, further studies should pay special attention on how to measure the logistics performance and define logistics cost of other types of firms.

Conclusions

The purpose of this paper was to explore some of the issues related to firms' logistics cost and performance in Vietnam. It was interesting to observe that respondents had difficulties in answering the survey questions and this could be interpreted as a lack of understanding related to logistics concepts. Maybe the challenge was also in the fact the questionnaire was translated into Vietnamese and logistics technical terms do not translate well.

The initial results from the survey also seem to concur with this interpretation as according to respondents' the concept of logistics cost is not well understood. The obtained logistics cost are consistent with other countries in terms of their composition with transport cost having the highest ratio but sector to sector comparison need to be done between countries in order to reflect adequately if firm's logistics cost in Vietnam are really that high.

Service level capability seems to be the most worrying issue with lower levels of performance when compared with neighbouring countries like Thailand. This is an area that has to be addressed quickly if Vietnam wants to maintain its growth momentum. Having lower labour, production or even logistics cost in itself is not sufficient to sustain an economy. Reliability is a key construct for logistics performance and there is an inverse relationship between logistics service quality level and logistics cost. The initial results of this survey do seem to point to that direction.

Further analysis is needed to understand the survey results. However these initial results does provide insight into the logistics cost and performance of Vietnamese firms. This is only the starting point in developing a base line of Vietnamese firms' logistics cost and performance database that could be further developed into a policy advisory tool to improve logistics in Vietnam.

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NETWORK STRATEGIES OF SUBSIDIARY AIRLINES
ASIA-PACIFIC REGION CASE STUDY

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Introduction
Airlines that have entered the aviation market in the Asia-Pacific region since 2000 have been able to offer international flight services (beginning in 2004) in line with a trend of liberalization in aviation. In response to the entrance and expansion of new low cost carriers (LCC), existing airlines have established affiliated LCC companies and subsidiaries, or entered into mergers. Specifically, attention has been focused on the increase in the number of domestic air passengers in Asian countries as well as international air passengers in the Asia region.

In the international aviation market in Europe, it is reported that airlines have made capital investments in regional airlines in their own countries, as well as in others, in addition to directly establishing new airlines following the full liberalization of services among the members of the European Union (Chang and Williams, 2002). Additionally, it has been reported that successful business models for allied airlines in Europe and the United States share the same strategy of having been established as airlines that connect low-density, short- and medium-range flights to and from hub and spoke airports (Gillen & Grados, 2008).

At the same time, another main network LCC strategy is to directly connect spoke airports with other spoke airports, using secondary and regional airports, without going through hub airports. To achieve lower costs and low airfares, flights are operated with a single-model fleet; and, the selection of that model is key in terms of network strategy since it relates to stage distance.

The new airlines in the Asia-Pacific region have diversified their business models, for example, adopting a two-fold competitive strategy of service quality, implementing partially fee-based services, and deploying low airfares. However, all of these models have the common strategic goal of network expansion. Given this current situation, the objective of this research is to elucidate the characteristics evident in the network strategies of airlines that are subsidiaries or allies of existing or new airlines based in the Asia-Pacific region.

To achieve this, we conducted a case study, focusing on AirAsia, Qantas Air (QFA), and Jetstar, which are said to be the most successful in the region, as well as All Nippon Air (ANA) and Korean Air (KAL), which entered the market relatively late. For this case study, we used information such as routes, stage distances, fleets, and traffic volume, referencing the annual reports of each airline and the OAG-Flight Guide Worldwide(Pitfield, Caves and Quddus(2010),Gillen(2006))[1].

In the following discussion, we will describe the network expansion of these new airlines in the Asia-Pacific region. In conclusion, through the case study analysis, we point out that the network strategies of new airlines in the region are limited in terms of their fleets and service differentiation in international medium- and long-range stages, due to geographical characteristics as well as the current state of conditional aviation liberalization.

Development of New Airlines
In the Asia-Pacific region, like in Europe, investments were also made that transcended national borders against a backdrop of a trend in aviation liberalization. The areas included Oceania and the countries of the Association of Southeast Asian Nations (ASEAN). Table 1 shows the capital relationships, years of international flight service, and the presence or absence of service, focusing on the main airlines in the case study. For example, as of 2013, excluding some of the subsidiary and affiliated airlines in Japan, it can be seen that most of the airlines studied are providing international flight service.

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[1]AirAsia (included Thai AirAsia and Indonesia AirAsia) was the top LCC in the Asia-Pacific region which carried 36.4million passengers in 2012. Jetstar(included Jetstar Asia, Jetstar Pacific) carried 20.6millions passengers with the third of LCC of Asia-Pacific, but Jetstar ranked the first carriers affiliated with incumbent airline (calculated with LCC traffic flows from Air transport statistics 2013, pp.126-127., original source :ICAO).

Figure 1 shows the changes in the number of air passengers in the Asia-Pacific region, and Figure 2 indicates the inter-regional movement. From Figures 1 and 2, we can see that the increase in the number of passengers on domestic flights in Asia contributed the most to the high growth rate of the number of passengers in 2004, 2006, 2009, and 2011. Although moderate in comparison to domestic flights, the number of international air passengers has also increased, as has the number of international flights in the Asia region. In 2013, it is believed that the number of international air passengers increased even more.

Figure 3 illustrate the aviation networks of two companies that were active, as shown in Table 1, in entering the market for international flights using allied airlines. QFA established Jetstar in 2004 and entered the market for international flights in 2006 in order to maintain their domestic flight share amidst the growing popularity of LCCs in Australia and New Zealand, while competing with Virgin Blue, another LCC. At the same time, QFA decided to discontinue service from Australian Airlines, another subsidiary, and transferred the airline's network to Jetstar Asia. This change signified the re-establishment of a network based in Singapore.

In addition, although there are 15 international airports in Australia, it is reported that Airport Traffic Data, The Department of Infrastructure and Regional Development(as Table 2)[2]. QFA concurrently operates a network that links small hubs and a long-range flight network that directly connects hub airports. As a result, it has even made changes to its single model fleet. In addition, the role of Jetstar has grown by focusing on central flight routes in high demand.

In the case of Malaysia's AirAsia, the airline has multiple allied airlines in the Asia region, just like QFA's Jetstar. As of fiscal 2012, AirAsia's domestic flights and international flights accounted for 40% and 60% of its operations, respectively. In Malaysia, out of 39 airports, five are international, and the passenger traffic volume at the Kuala Lumpur International Airport (KUL) in 2012 accounted for approximately 71% of all Malaysia's traffic volume (MOT, MA). AirAsia uses the LCC terminal (LCCT) at KUL and in fiscal 2012, its domestic air passengers accounted for 61.8% of the airport's volume. In terms of international air passengers, AirAsia, including AirAsiaX and Indonesia AirAsia, accounted for 39.2% of the volume at KUL (see Table 3). Although QFA and AirAsia are similar in that they have multiple allied airlines and are looking to expand their networks, as we can see in the market share of KUL passenger volume, as well as the route map in Figure 3 (a) and (b), the introduction of a hub and spoke system is noticeable in AirAsia's international transportation system.

A similar introduction of a hub and spoke system can also be seen in the routes of the subsidiaries of ANA in Japan, and operations are being carried out with each base airport as a hub. Since the introduction of the Asia Gateway Policy in 2007, airports in Japan have continued to experience temporary flight service of foreign airlines. Out of a total of 98 airports in Japan, there are 41 airport locations that have a runway of 2,500 meters or longer, where it is possible for A320s and B737s to take off and landing. Although the hub airports of Peach Aviation and Vanila Air differ, they are both operating in a range in which it is possible to fly round-trip in terms of stage distance, with their single model fleets of A320s[3]. In particular, since its full-scale services for international flights are beginning now, with Hong Kong being the only place in China where it will fly, the fact that the airline market environment in the Asia-Pacific region is not yet sufficiently prepared for competition on regional international flight routes is underscored.

Japan Airlines has also expanded its network, with a focus on domestic flights, through the establishment in 2012 of Jetstar Japan, a joint venture as well as the subsidiary presented in Table 1. Although Jetstar Japan began providing international flights in 2013, the focus of this paper is on international air transportation and for this, Jetstar Japan are considered from Qantas Group side.

Due to the operation of single model fleets of the Boeing 737-700 and 800 series (around 140 seats) by new airlines, (including airlines that are not subsidiaries), the stage distance of routes where these companies can gain entry have similar conditions. This is evidenced by the repeated discontinuation

[2] AIC reported 13 airports in Australia, 25 airports in Malaysia, 8 airports in Japan, 15 airports in Korea (from, Air transport statisitcs2013, p.140).

[3] A320s Flight distance 3,300nm(6,100km) in Peach Air(Fleet ; HP) and Vanila Air(Aircraft seal no. ; safety report2012,p.16).The most long flight distance are 2,482km(Peach Air ;from KIX to HKG) and 2,106km(Vanila Air ;from TYO to TPE).

of services by Hanson Airlines and Yeongnam Air, among the earlier LCCs established between 2004 and 2006 in South Korea. In December 2009, Jin Air, a subsidiary of KAL, began providing services for the first time for short- and medium-range tourist routes to Bangkok, Thailand. Further, due to the fact that regulatory authorities prioritize the distribution of flight routes to new airlines in South Korea, the establishment of Jin Air was the natural choice for KAL in order to maintain its routes and expand its network.

Conclusion

Short- and medium-range air flights have increased in the Asia-Pacific region alongside the liberalization of aviation. New airlines, introducing a LCC business model or diversified business model, have been established or converted, shedding light on the application of the hub and spoke systems used by existing airlines for their international flight networks.

At the same time, in addition to directly connecting long-range flights, QFA introduced the diversification of its subsidiary's fleet depending on stage distance in response to price competition, as through the enhancement of Jetstar's network. In other words, it can be said that there has been a shift from existing airlines to subsidiaries for flights within the Asia-Pacific region and for long-distance flights.

The expansion of airlines such as those covered in this paper can be attributed to the current state of conditional aviation liberalization as well as regional characteristics that place limits on fleets and the service differentiation of medium- and long-distance international flights. As a result, it has become necessary to differentiate aviation services through demand analysis. We hope to develop this topic even further in future research.

Airlines group	Int'l flight	Shareholders	Airlines group	Int'l flight	Shareholders
Qantas(QF)			*AirAsia (AK) (2001) 1)*	2004	AK; 100%
Jetstar (JQ)(Australia, New Zealand) 2004	2006	QF; 100%	AirAsia X (D7)	2007	AK; 48.9%
Jetstar Asia(3K) 2004	2004	QF; 49%	Thai AirAsia(FD) 2004	2011	AK; 45%
Jetstar Pacific(BL) 2008	2013	QF; 30%	Indonesia AirAsia(QZ) 2004	2009	AK; 48.9%
Jetstar Japan(GK) 2012	2013	QF; 33%	Philippines' AirAsia(PQ) 2010	2012	AK; 39.9%
Jetstar HongKong(JM) 2013	2014planned	QF; 33%	AirAsia India(I5) 2013	2013	AK; 49%
QantasLink			Thai AirAsia X(XJ) 2013	2014planned	AK; 49%
Japan Airlines(JL) 2)			*All Nippon Airways(NH) 3)*		
Japan Transocean Air (NU)1967 1993		JL; 72.8%	Air Japan(NQ)* 2002 (only international)	2002	NH; 100%
JAL-Express(JC) 1998		JL; 100%	ANAWINGS(EH) 2010 (only domestic)		NH; 100%
J-Air(XM) 1996		JL; 100%	Peach Aviation(MM) 2011	2013	NH; 38.7%
Japan Air Commuter(3X)		JL; 60%	Vanila air(JW)** 2013	2012	NH; 100%
Ryukyu Air Commuter(nil)		JL; 74.5%			
Jetstar Japan(GK) 2012	2013	JL; 33.3%			
Korean Air(KE)			*Asiana Air(OZ) 4)*		
Jin Air(LJ) 2008	2009	Hanjin Kal; 100%	Air BUSAN(BX) 2010	2012	OZ; 46%

source : Qantas(Annual Report2013,p.123), AirAsia (Annual Report 2013, p.28, forth quarter report 2013,p.12), Japan Airlines(Annual Report2013,p.59), All Nippon Airways (Annual Report2013,p.140), Jin air & Air Busan(from Fiinancial supervisory service) .

note : 1) Philippines'AirAsia ("PAA") which has been fully consolidated with AirAsia Zest(partnership from Feb. 2014, from www.airasia.com/docs/common-docs/investor-relations).Thai AirAsia X flight to incheon between Bangkok(Donmuang) and Incheon from Jun 2014(http://www.airport.kr/airport/flightinfo).

2) XM(from FY2005), JC(from FY2011).

3) *NQ merger ANA&JP express in FY2006, merger Air Next, Air Central,Air nippon network in FY2010. **AirAsia Japan until May 2013.

4) Asiana Air announced plan to establish new subsidiary airline Apr. 2014.

Table 1: Airlines Group

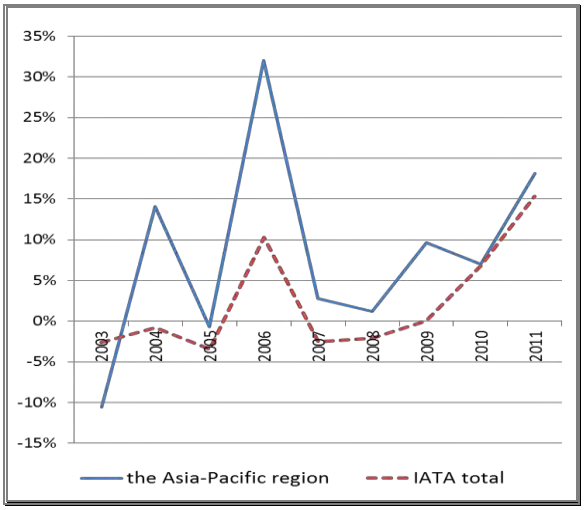

Figure 1: Growth rates of the Passenger traffic
Source: *Aviation Statistics (JAPAN)*(original source: IATA World Air Transport Statistics)
Note: (A)Int'l share means int'l flight share of the Asia region

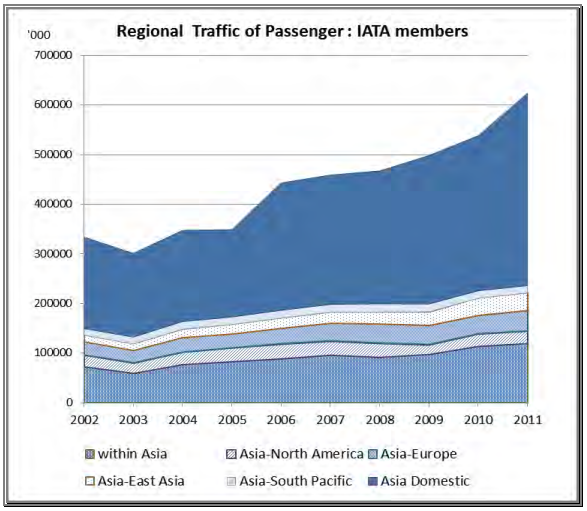

Figure 2: Regional Traffic Passenger
Source: *Aviation Statistics (JAPAN)*(original source: regional traffic from IATA World Air Transport Statistics)

	Airport for Civil Air Transportation(only civil)	International Airport
Malaysia	39(18 (1))	5
Australia	102	15 (2)
Japan	98	41 (3)
Korea	12(8 (4))	8

Table 2: Infrastructure: Airports

Source: ・Malaysia (from *MAHB Ann report 2012*, p.4.) ・Australia (based on [regular public transport operations only], *Airport Traffic Data*, The Department of Infrastructure and Regional Development ・Korea (*Pocket Aviation Status2013*, pp.159~162.) ・Japan(the Ministry of Land, Infrastructure, Transport and Tourism Home Page; access Jan 24, 2014).

Note: (1) include STL airport (2) included restricted use (3)Liberalization (Asia gateway policy of 2007) (4)Civil only

Airlines	Passenger tra	Airport	market share	state	market share
Dom-AirAsia	7349616	Dom-KLIA	61.8%	Dom-Malaysia	21.3%
Itnl-AirAsia(G)	10958705	Intl- KLIA	39.2%	Intl-Malaysia	33.4%
total-AirAsia(G)	18308321	Total KLIA	45.9%	Total-Malaysia	27.2%

source: calculated by Airline Passenger traffic (data from MAHB Ann-report2012,p.317), passenger movement (data from KLIA Presentation, p.15).

Table 3: Market share of Passenger traffic: AirAsia (2012)

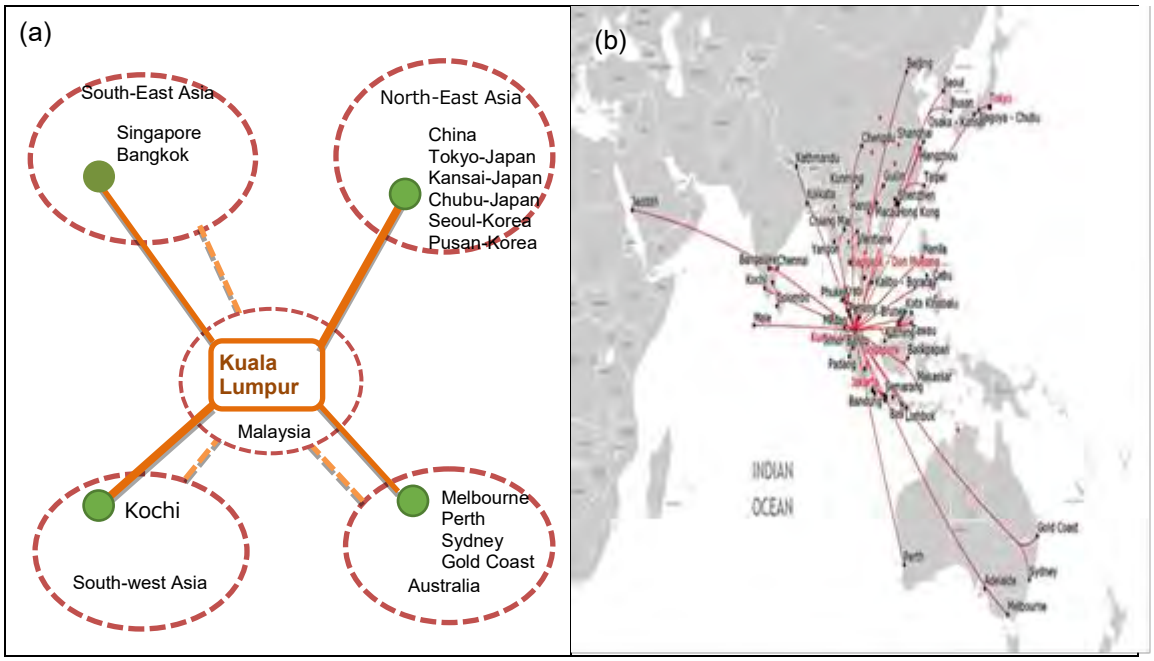

Figure 3: Network of AirAsia
Source:network from *AirAsia Annual Report2013*

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THE INFLUENCE OF NATIONAL CULTURE ON USE OF THIRD PARTY LOGISTICS

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Introduction

Chiang Rai is situated in the northern region of Thailand and is considered as a strategic location of the country because Chiang Rai has a border connected to neighbouring countries such as Myanmar and Laos. With this reason, local people in Chiang Rai have trade activities with local people from Myanmar and Laos along the border. Products from Myanmar and Laos that are traded within these regions are mostly from third countries nearby such as China and Vietnam (Banomyong 2013). Major products from Thai side are food, agricultural products, construction materials, electricity appliances, and car material products (Ishida & Isono 2012). The products that are transported in and out in Chiang Rai province could be in two major modes of transportation, which are boats and trucks. Products that are transported by boats were shipped along Mae Kong River and the products are initially uploaded into the boats from and to China. However, products that are transported by trucks passed through Laos are also from and to China, where Chiang Rai carries a border check point duty both for the import and export products. The logistics system plays a significant role to help transport products receiving from other countries in Chiang Rai province and to distributing to other provinces in Thailand (Banomyong 2013). Third party logistics is a logistics system popularly used in Thailand. The aim of Third Party Logistics is to help businesses to minimise their transportation cost and increase marginal profits to their businesses. This paper also aims to investigate influence of national culture of businesses located along the border region of the northern part of Thailand in using the third party logistics and the impacts causes to them. Previous research highlighted the effect that national culture has on the propensity for small, independent manufacturing enterprises to (1) cooperate with other firms for technological innovation and (2) use equity ties in the formation of these alliances (Steensma et al. 2000). However, national culture represented as an arising of inner feeling of local companies to impact the use and nature of cooperation. For example, many businesses from various industry clusters all over Thailand has been partly attributed to its value system and contributes large income to the country, which fosters efficient cooperation between firms by reducing transaction costs by using the external outsourcing companies for their logistics system.

The structure of this paper comprises with the concept of supply chain and third party logistics, then managing people across culture is summarised. The other topics are implications of the influence of national culture on the use of 3PLs of local businesses in Chiang Rai.

Supply Chian along the Border Area of the Northern Region of Thailand

Natural resources are limited and people all over the world change their behavior in consuming products, whilst this was because they had more educational level. These people attempt and tend to acquire natural resources from other pertinent and consume them. Hence, the process for designing, sourcing, producing and distributing products in the world markets become more important and play a significant role (Gupta & Palsule-Desai 2011). Many researches were then conducted to understand how organisations or businesses can be able to efficiently manage and facilitate of entire supply chain to supply products to their customers. Supply Chain involves with management of information flow, goods and services flow, and financial flow whilst the businesses along the border area in the northern region of Thailand also have similar processes. The collaborations amongst parties and between different companies along the supply chain are of vital for their success. However, the businesses can utilise information to achieve improvements in sharing information with their business partners in their integration of process (Trkman et al. 2007). Appropriate business processes are basic requirements for the strategic use of information through suppliers to third party logistics to ensure the flow of products and services to reach destinations.

In business operations along the supply chain, process uncertainty can be caused by low performance or by the nature of material flow. The process uncertainty can lead to uncertainty in the delivering products to customers. Each stakeholder along the supply chain must deal with different processes effectively. These processes can vary in terms of quality, post-processing quality from upstream suppliers to downstream customers along the supply chain and through time (Van Der Vorst 2000).

To process the supply chain management efficiently, logistics activities has become a global trend. This paper provide an insight into an aspect of logistics outsourcing or the 3PLs as this technique is intensive and provide benefit reduction outweighing the cost and time (Jharkharia & Shankar 2007). The following section explains third party logistics.

Third Party Logistics

Generally, the 3PLs is a logistics outsourcing that is defined as a subcontract arrangement whereby a logistics service provider performs a range of services for a firm, instead of they provided, in-house (Min 2013). The use of a logistics outsourcing or the 3PLs allows the firm to be able to focus better on their business competency (Mingmalairaks 2011), whilst exploits external resources and expertise in handling their logistics activities (Min 2013). Most countries all over the world are ready for outsourcing, especially small and medium sized enterprises. These small and medium sized businesses attempt to outsource as much as possible to help minimise their business operations cost. The third party logistics is then becoming one of their choices of selection for their product transportations.

Even though the extant body of literature on the 3PLs and the culture in using 3PLs is vital, there is only little effort has been devoted to integrate the literature in the research on 3PLs. An attempt to review the status of literature on 3PLs in this paper is then made to understand the 3PLs that are being used in the Thai context, particularly along the border area in the northern region of Thailand and how the national culture impacts on them.

The third party logistics can be a way to turn environmental problems into business opportunities for many businesses along the supply chain and many companies begin to consider the green aspects can be integrated into their service offerings to their customers. This is because many people have put their awareness of business operations on the green concepts. For example, in China, the customers need more education on logistics because their knowledge in this area was limited in the past. The business owners in China accepted the idea in using third party logistics rapidly when comparing with other countries. This was because' customers trusted that the use of third party logistics helped their business in terms of transportation more efficiently (Lau & Zhang 2006). With this reason, these business owners in China can learn from other experiences and they have more external pressure to improve current products and services to survive their business. The result indicates that domestic businesses in China rather outsource more to enable their business capability and efficiency. Later on, China has emerged as a major logistics hotspot in Asia, a growing number of multinational firms that enhance the logistics efficiency through the use of third-party logistics providers in Asia (Zhou et al. 2008). Therefore, the third party logistics is of vital important for the businesses all over the world and becoming more important for businesses along the border, especially in the northern part of Thialand.

Managing People across Culture

Hofstede (1980) explains his cultural framework, which includes power distance, uncertainty avoidance, masculinity and femininity, and individualism and collectivism. In Hofstede (1980), he explains the importance of set of behaviour in the view of relationship both person and the situation. When the behaviour of a person is observed, the presence of stable mentor programs was inferred (Hofstede 1980). Furthermore, Trompenarrs and Hampden-Turner (1998) adopt a wide meaning of culture highlighting national values and preferences. The results in his study demonstrated that training would be a strategic tool for leaders or managers to be able to achieve towards their business goals whilst building a learning organisation and leadership development across cultures would also be considered as another strategic tool for businesses to minimise conflict and guiding for problem resolution (Smith et al. 1996; Trompenaars & Hampden-Turner 1998). Trompenarrs and Hampden-Turner (1998) reveal that organisational culture stimulate creative thinking and encourage organisational learning (Al-Alawi et al. 2007). Trompenarrs and Hampden-Turner's study related in this study because local business owners learn from their business experience that the third party logistics was useful and help their business transport products efficiently at lower cost. However, this study only highlights three parts of Hofstede's work, which are uncertainty avoidance, masculinity, and individualism. The power distance was not discussed in this study because it referred to which the members of a society expect power to be distributed equally in the organisation. Hence, this paper only focused on the SMEs or local business long the border in the northern region of Thailand. Their

size of organisations were not large and individualism was more appropriate to discuss in this study (Hofstede 1991; Lau & Zhang 2006; Smith et al. 1996).

Figure 1 proposes a study model and framework, which was derived from an extensive literature review and from the discussion with main key informants in Chiang Rai. The major key informants were the Director of Chiang Rai Tourism Association, Director of Chiang Rai Industrial Association, Director of Chiang Rai Chamber of Commerce, and one of key business owners in Chiang Rai.

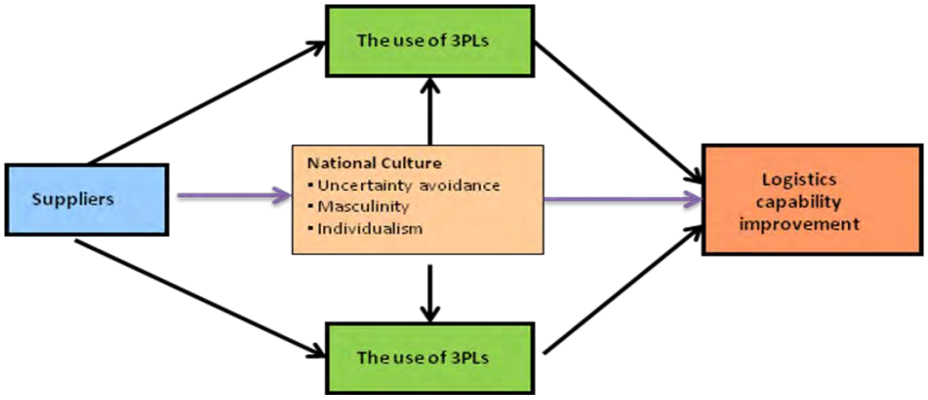

Figure 1: The conceptual framework of national culture towards the use of 3PLs

Figure 1 explains the study approach that focuses on an effect of national culture with an attempt to understand how decision-making is being made by businesses towards the use of third party logistics (3PLs) then proposes conceptual framework. This paper examines three cultural traits, which includes 1) uncertainty avoidance, 2) masculinity (competitiveness), and 3) individualism. Firstly, uncertainty plays an important role in decision making of businesses generally; particularly it was found a relational uncertainty in the local business in the Thai border area of the northern region. Local businesses need to seek appropriate and reliable business partners, especially external outsourcing companies or the 3PLs to help delivering their products and distributing them throughout other location of Thailand. Secondly, to utilise the third party logistics allows the local businesses to empower their business competency, which leading to cost reduction, reduce competition level, and increase business performance. Thirdly, most local businesses maintain their individualistic value, which directly impacts to their business operations (Shane & Venkataraman 2000).

The third party logistics has a relation with the network theory (Granovetter 1983; Walsham 1997), the firm's relations with its logistics service providers through outsourcing contracts constitutes to most valuable intangible resource for businesses such as, logistics knowledge and their business competencies (Halldórsson & Skjøtt-Larsen 2004), which creates competitive advantages over their competitors in the fierce competition era (Mingmalairaks 2011). However, this study used the exploratory to explain the phenomenon.

The exploratory work approach characterises a brief, fleeting, and focuses at the preliminary stage in the study process leads to understand the real situation and can contributes to the theory (Berg & Lune 2004). The outcome of this exploratory study procedure is the production of inductively derived generalisations about the group, process, activity, or situation of businesses in Chiang Rai province. In-depth interview and observations of major businesses were used to primarily understand their decision-making on the use of 3PLs. The reviewed of literature and interpretive approach were selected in this paper as the paper aimed to understand the phenomena through the meanings that people assigned to their business activities (Patton 2005; Silverman 2011). The works on culture by Hofstede (1980, 1984) and Trompenaars et al. (1996) were used as guided to explain communication and implementation of decision making by local businesses in using 3PL. Theory as practice, organisational culture, and business performance were also used in this study to frame up the conceptual framework (Mingmalairaks 2011; Spee & Jarzabkowski 2011). Hence, this paper developed an understanding of the local businesses towards the national culture on the use of 3PLs efficiently for their business operations.

In the northern region of Thailand, especially the border area of Chiang Rai, products are delivered pass through the border region to other countries such as Myanmar, Laos, China, and Vietnam. The third party logistics has been used as the small and medium enterprises are not willing to initialise their investment for their own transportation because they know that the high investment will not repay them back in a short period of time. With the limitation in the size of businesses, these SMEs have similar limitations in financial investment.

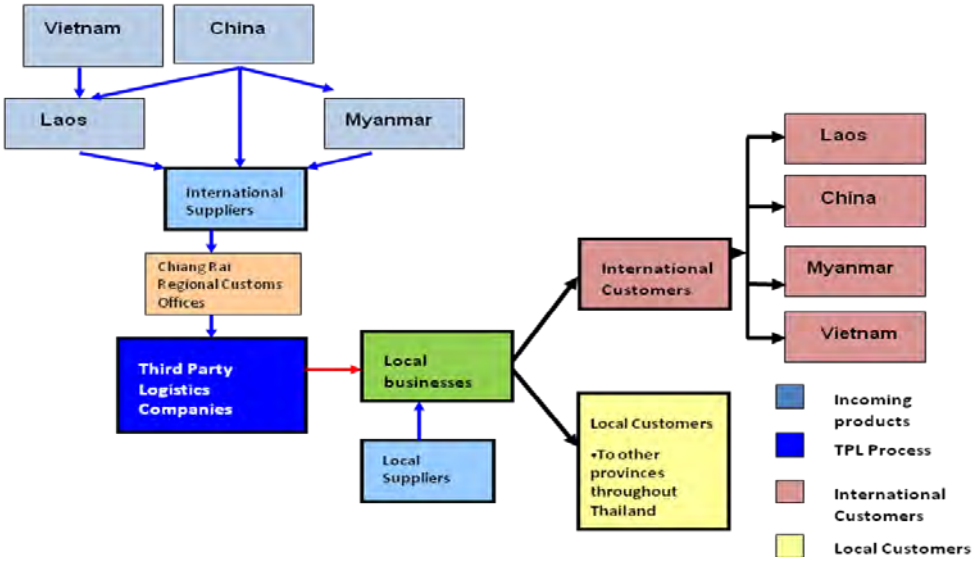

Figure 2: Border trade supply chain and the transportation flow of products in Chiang Rai Border Area

Figure 2 demonstrates logistics flow of products and how the external outsourcing companies or 3PLs provide their services to local SMEs in delivering products both from other countries then transporting to other provinces within Thailand and from the border area of Thailand to other countries. The figure 1 demonstrates that international suppliers transported their products from Laos and Myanmar, Vietnam through Laos, and China delivers their products through Mae Kong River and also through Laos and Myanmar.

From the information derived from a discussion with major key informants in Chiang Rai, the Director of Chiang Rai Tourism Association, Director of Chiang Rai Industrial Association, Director of Chiang Rai Chamber of Commerce, and one of key business owners in Chiang Rai agreed similarly that compatibility between the user and the provider companies is the most, important determinant, which influences the final selection process on the use of 3PLs (Aguezzoul 2014; Jharkharia & Shankar 2007). Appropriate flow of information would help logistics flow to reach to consumers efficiently.

Implications of the Influence of National Culture on the Use of Third Party Logistics

The implication of this study highlights on national culture on the decision making in using 3PLs of businesses along the border region in the northern part of Thailand. Even though there was little study in literature of businesses along the border region in the northern of Thailand, why and how they use logistics companies for the border trade is of vital important. This study would provide an understanding of selecting suppliers in relation with the national culture use of 3PLs, which would lead businesses to gain benefits and business operations improvement at lower cost that impact on them. From interviews with key informants in Chiang Rai, the culture in the use of 3PLs could be explained as follows:

Uncertainty avoidance

According to Hofstede (1991), uncertainty refers to the environment that the members of cultures in the society feel threatened by uncertain situation. The uncertainty avoidance in this paper is regarded to the legal system, rules, and regulations that set forth to allow local businesses to operate their business activities. Even though there are some obstacles on trade facilitation along the border area such as a long process at the custom house, according to interviews with major key informants in

Chiang Rai. The business owners from trading countries have to find appropriate way to shorten their logistics process to minimise the lost on delivery of products, as major products are agricultural products. Thus, logistics system allows them to use the 3PLs or the external outsourcing businesses to help them to minimise their logistics costs. Therefore, the uncertainty avoidance at the national level influences the local businesses or entrepreneurs to collaborate with other businesses where they adopt better technological efforts to utilise them to benefit their business operations (Mingmalairaks 2011).

Masculinity

The term masculinity in this study refers to the 'toughness' and competitive environment of businesses and society (Hofstede 1991). The aggressiveness of the business competition environment represents the toughness (Mingmalairaks 2011), which is referred to the masculinity in Hofstede's explanation. However, femineity societies or countries demonstrate preferences for resolving conflicts while enhancing a compromising and negotiation environment for success. This paper revealed that the local businesses along Thai border area in the northern region also adopted uncertainty as to increase a competitive level, whilst to reduce cost of operations and seeking for the use of appropriate 3PLs to run their business efficiently (Hofstede 1991; Trompenaars & Hampden-Turner 1998).

Individualism

Individualism characterises societies in which the ties between individuals are loose and everyone is expected to look after himself/herself while collectivism characterises that people are integrated from birth onwards into strong and cohesive in group (Hofstede 1991). In this paper, the individualism referred to entrepreneurs that operated their business individually under their own decision making and they preferred to use 3PLs to minimise their cost of operations and highlighted their competencies in other areas such as their products and administrative competencies (Mingmalairaks 2011).

According to the interviews with the major key informants in Chiang Rai, the local business owners outsource their entire logistics activities. The use of external companies to manage logistics activities as third-party logistics service providers become a common practice in Thailand and, especially the border trade businesses in the northern of Thailand (Aguezzoul 2014). The culture of using the 3PLs becomes a driver to solve their business need and minimise their cost. This culture of using 3PLs also leads these border trade businesses to concentrate on their core competencies, achieve at their expected level of cost reduction, develop their supply chain partnerships, and improve their services and operations efficiently. The following topic discusses on limitation.

Limitations

This paper proposed a study framework to help outline the following phase in studying the influence of national culture on the use of 3PLs. This paper shredded lightly on the local SMEs perspectives as to generalise the literature with information derived from the main key informants, which were the Director of Chiang Rai Tourism Association, Director of Chiang Rai Industrial Association, Director of Chiang Rai Chamber of Commerce, and one of key business owners in Chiang Rai. However, there are some limitations in this paper. Firstly, the number of key informants is limited and more number of local SMEs would enhance the generalisability of findings and results for further study. Secondly, time constraint was another limitation in a forum discussion with the key informants, whilst there could be more information that were missed out and required appropriate interpretation. Finally, this paper is written on a preliminary stage and more information from observations at the SMEs' premises could be a great source for information.

Conclusion

The major contribution of this paper is a development of a comprehensive methodology to understand the national culture of local business owners in Chiang Rai province incorporates with diversified issues, for the decision of using third party logistics as providers to facilitate their logistics activities. To develop understanding and knowledge on third party logistics and the cultural dimensions that impact on decision making of businesses towards the use of 3PLs are vital for businesses. The paper also provides for a review of the issues, which national culture influences the selection of third party logistics. The important aspects of this study identified and verified the perception of success relationship of national culture and decision making of local businesses in using 3PLs though logistics capability improvements. This paper reviewed extensive literature and determined the impact of

national culture of local business along the border area in the northern of Thailand then developed and proposed conceptual framework to improve logistics capability. Interview was also conducted with business leaders in Chiang Rai such as the Director of Chiang Rai Tourism Association, the Director of Chiang Rai Chamber of Commerce, and the Director of Chiang Rai Industrial Association. The influence of national culture has impacts on the use of 3PLs in three area, which are uncertainty avoidance, masculinity (competiveness), and individualism.

SMEs or local businesses in the northern of Thailand were in uncertainty avoidance because they attempted to avoid uncertainty by using the 3PLs, thus to reduce cost and avoid uncertainty level in delivering products to the customers. They would have high uncertainty in delivering product to the downstream customers when they use their own logistics system. SMEs in the northern border area of Thailand therefore utilised logistics companies and shared their technology and expertise in logistics rather than making own investment. SMEs or local businesses in the northern of Thailand had both a relatively high level of masculinity as they focused on the competitiveness. A relatively high level of femininity was also observed because these businesses also sought compromising in solving problem for their businesses. The businesses in the Thai border region focused on the competitiveness because they want to gain more profits while reducing their cost of operations. The use of 3PLs helped them to be eligible to focus more on their own business competency, while sharing the expertise of the 3PL companies as they were more expertise in the logistics competency.

The following phase of this study should highlight on how local business owners perceive their business success via the use of the external outsourcing companies to process their logistics functions o behalf of their business operations. Each category of the cultural framework selected for this study should be clarified in relation with the use of 3PLs and explains the usage efficiency of the 3PLs of SMEs or local businesses in this region. Future refining work and a refining method thereafter the observation process and more number of interviews with the users of 3PLs in the next stage would be useful and help contributing vital information for this study.

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A STUDY ON RELIABILITY OF LOGISTICS NETWORK FOR THAI ORGANIC FOOD TO INDIA

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Introduction

An interest in organic food products has increased throughout the world due to an increasing trend in health awareness at present. Also, an increasing number of world populations, food scares was arising and seen in every spot of the world. Most consumers purchase fresh organic food products are because consumers expect that consuming fresh organic food products would help them to be healthier and to look young, and also the fresh organic food products are environmental friendly (Fritz & Schiefer 2008). Even though the demand for organic food has increased, but the organic food is still only for a niche market and consumers regularly confuse between the various 'pesticide safe' labels and the organic labels because they do not clearly differentiate the products.

Most countries, both in less developed and developing countries have an increasing awareness of the severity of the domestic problem as well as increasing pressure by international trading partners to comply with international standards in Thailand. As a result, the Thai government overhauled its approach to food safety (Roitner-Schobesberger et al. 2008). This leads to an opportunity for the Thai farmers to consider growing organic food products and export them to other countries such as India. Also, it is of vital that consumers have appropriate understanding about unique characteristics of fresh organic production methods, the strict inspection and required third party certification. With this reason, consumers who have high level of health awareness and related concerns feel more comfortable to consume organic food products and number of consumers that consume fresh organic food products tend to be increased rapidly both in Thailand and throughout the world (Krystallis & Chryssohoidis 2005).

To exports fresh organic food to other countries, there is a need to have appropriate logistics network to transports fresh organic food products, thus minimise defect organic food products while transporting efficiently. This study focuses on the reliability of logistics network system for Thai fresh organic foods to India; this paper focuses on Thai organic fruits. Though the logistics security challenges was a partial concern to businesses in Thai organic food industry exporting to India, information security, transport safety, process safety and storage safety were also included in the major interest of this study.

The paper begins with an extensive discussion of the international literature surrounding the organic food products and organic consumers, then logistics network, obstacles in fresh organic fruits, and the conclusion is made.

Organic Food Products

Many researches and studies concerning consumer organic food products have been conducted in all over the world such as EU countries and the US (Fritz & Schiefer 2008; Kottila & Rönni 2008; Krystallis & Chryssohoidis 2005; Roitner-Schobesberger et al. 2008). Much of these studies investigated how consumers perceive and understand the organic concept, the consumers' demand for organic produce, consumers' attitudes, and the factors that facilitate the acceptance of these products (Krystallis & Chryssohoidis 2005). The important issue when producing agricultural products is the link between intensive mass production and its environmental influences. The organic food products have all concerned criteria as they are produced in high environmental concerns in the organic farming (Fritz & Schiefer 2008).

Generally, organic farming refers to a farming system, which uses organic manure, and avoids or largely excludes the use of synthetic fertilizers, pesticides, and chemicals (Gil et al. 2000). There are many reasons indicating an increasing growth rate of organic food products. This would inform the

farmers to know basic requirements in growing fresh organic food products and to learn the opportunity to grow the fresh organic fruits and export to other countries such as India. The fresh organic fruits products have an added value and the market share of the fresh organic food industry is still viable in most countries. India is one of the target markets for the fresh organic fruits, whilst many countries consider Indian markets as their potential market opportunities. Therefore, the potential demand for organic fruits is still at high level and expected to be increased in the near future.

This has resulted in a number of initiatives and labels indicating 'pesticide safe' vegetables and 'organic food' afterward. However, the pesticide-residue problem has proved enduring. This opens a market opportunity for organic foods, which are produced entirely without using synthetic chemicals. The major barriers to purchase fresh organic food are the limited information on organic food products and the lack of information of consumers that have on organic farming procedures in the farms. Consumer is another factor that influences on purchasing organic food products as more number of consumers claim that they are environmentally conscious at present and that places additional standards on manufacturers, distributors, retailers and policy-makers over the organic food products.

The growth of organic food industry is still at moderate low level in Thailand and organic food products are considered as high prices products. The imbalance between supply and demand was still exist, whilst high operating costs, lack of information flow, and poor supply reliability highly were observed in the organic food industry. At present, consumers who tend to purchase organic food products all over the world tend to be older people, higher income level, and have higher education. These customers include customers in India. As little is known on consumer perception of organic foods in India, there is a need to study and investigate the perception of organic food and the logistics network for fresh organic food, especially for the Thai farmers to export their fresh organic food products to India efficiently. The following topic discusses on logistics network.

Logistics Network

Food scares issue and food related to high levels of pesticide residues that regularly found on vegetables and fruits has increased a consumers demand to acquire for a 'safe' foods in Thailand as well as in other parts of the world. In the food industry, which includes the food organic business, one of the main goals of the food business industry is to establish an efficient purchasing, transportation, physical distribution and logistics system together. The integration of an efficient business operations will lead the food company to achieve economies of scale (Bourlakis & Bourlakis 2004). Then, an appropriate logistics network will be a strategy to develop the market for fresh organic foods.

There is growing number of consumers that concern about natural products as well as concerns about food safety and nutrition, where there is a linkage notion of food quality to notions of nature in the fresh organic food products (Goodman & DuPuis 2002). Similarly, an increasing importance of health and the impact that food production has on the environment and consumer food choice is reviewed in various literatures (Gil et al. 2000). Therefore, firstly, knowledge about fresh organic food products is vital for both producers and consumers. Knowing characteristics of fresh organic food products and its food quality are increasingly important. Also, consumers have more concerns about the nutrition, health, and quality of food they eat at present (Goodman & DuPuis 2002; Zanoli & Naspetti 2002). An expansion of differentiated in natural food production networks is a key trend as the fresh organic food products affluences and enhances food safety concerns. As some consumers only search for higher quality and healthier food products, fresh organic food products still encounter with some problems related to consumer product acceptability. It is therefore a need that fresh organic fruits famers understand their product characteristics and grow them according to the organic food standard and consumers' needs. The result leads to an increasing need of fresh organic food products and a steady growth of fresh organic food products in the food industry.

Secondly, the organic food is unique and relationship between producers and consumers is high. Hence, the aim for minimal transportation and short chains are regularly regarded most suitable for organic food. The major challenge with fresh organic production is the difficulty in selling fresh organic food products in retail food markets because the retail food markets have to be unique. Therefore, there is a need for logistics network to develop logistics network to be able to distribute products to the right target markets (Kottila & Rönni 2008). The relationship between the organic suppliers and the manufactures or the retailers in the mainstream food chain, is a relationship between small and big volume actors because the big manufactures will transport organic food products to their retails and

then to end customers. The organic suppliers are often highly dependent on a few conventional retailers, which offer the only reasonable access to consumers in many countries. Therefore, logistics network also focused on the relationships between the suppliers and the other stakeholders along the supply chain. Previous studies have mainly focused on dyadic relationships. In organic food chains, the relationships need to be studied along the whole chain for the reasons previously highlighted.

Methodology

This study used a qualitative approach. Secondary data was reviewed to find how Thai organic foods were exported to India. Statistical information was also gathered to understand the Indian market and opportunity for Thai businesses to export organic food to India. In-depth interview was used in the qualitative approach whilst the Thai consulate in India and 5 major businesses were interviewed to understand business situation and how logistics network system was implemented. Work system theory, organisational culture, and adoption of IT were used to provide guideline for this study to develop logistics network system for Thai organic food to India as well as to improve reliability of logistics network. Statistical information from secondary source was analysed by using descriptive statistic to explain the trend and situations for Thai organic foods exporting to India. However, narrative approach was used to analyse the data derived from interviews with the Thai consulate in India as well as from the five major businesses that export Thai organic foods to India.

The qualitative approach was adopted in this paper because this paper aims to investigate the real problem and how to develop appropriate logistics network for fresh organic food products (Patton 2005). The real situation as explained in the qualitative approach could be use to develop understanding and guide direction in this exploratory study (Patton 2005, 2008). In essence, the researcher had to interpret information from the key informants from the interviews about what they said and believed (Silverman 2010). An interpretative approach looks for multiple interpretations and a deep understanding of the often conflicting rationalities of the actors involved in information systems innovation (Creswell 2012; Myers & Avison 1997). The interpretive approach in this paper uses interviews together with open-ended and structured questioning methods and looks for meaning to explain in the narratives formed.

Discussion

The interviews were arranged to meet and discuss in India to study general information to understand the business environment and context in India. A personal relationship was used to arrange a contact with the Thai consulate in India at his convenient time and also asked for his advises for arrangement to meet with five major business owners in the organic food industry in India. The Thai consulate provided assistance and information derived from interviews demonstrates in table 1.1.

Organisations	Information inquired
Thai Consulate	• General information about economics in India • Import-export and trade information
Business A	• Trade information, organisational culture, business strategy, knowledge about products and industry, and logistics network, work system, IT
Business B	• Trade information, organisational culture, business strategy, knowledge about products and industry, and logistics network, work system, IT
Business C	• Trade information, organisational culture, business strategy, knowledge about products and industry, and logistics network, work system, IT
Business D	• Trade information, organisational culture, business strategy, knowledge about products and industry, and logistics network, work system, IT
Business E	• Trade information, organisational culture, business strategy, knowledge about products and industry, and logistics network, work system, IT

Table 1: Organisations and information derived from interviews

Even though can produce organic products in their countries but the organic product are not sufficient for all consumers who love organic products in India (Garibay & Jyoti 2003). Therefore, this brings a great opportunity to the Thai farmers to grow organic fruits and export to India. Information derived from key informants at interviews at their premises in India could be summarised and developed in a conceptual framework as demonstrated in figure 1.

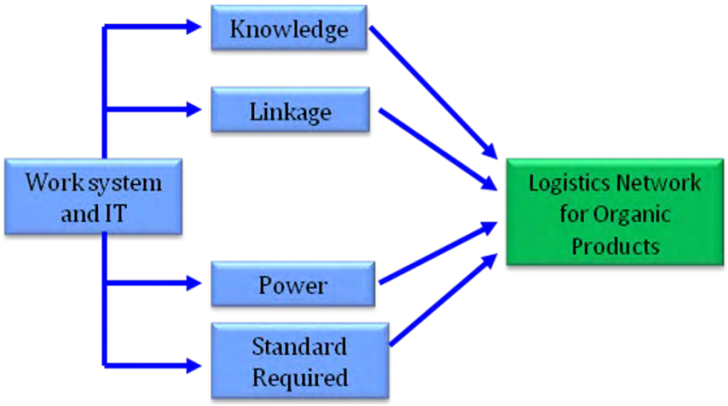

Figure 1: Framework for fresh organic food products logistics network

Figure 1 shows four factors that lead to reliability logistics network for organic food products. The work system theory use as guide associated with the IT to drive the process of network more efficiently at present (Mingmalairaks 2011). Knowledge plays a key role in binding networks together. Knowledge about the networks from producers and distributors liaise the services that distribute organic food products to end customers. Since this organic food product is unique, both producers and customers need to have education and understanding of products. In the farmer side, the minimum requirement is the understanding of the standard of fresh organic food products such as the International Federation of Organic Agriculture Movements (IFOAM).

Network links can ensure that agents and links are influenced to conform to the precepts of the entire network. The linkage in networks is regularly forged by co-operation. Thirdly, power relations in networks are consolidated by some mixture of coercion and consensus. Therefore, power is require while utilising network. This is evident that make network truly effective. However, network requires a degree of trust amongst the participants involved because the use of coercive power in some instances cannot guarantee an integrated cooperation amongst participants involved into the network (Morgan & Murdoch 2000).

The power required as the third component because the fresh organic food products requires short logistics arrangements to avoid contamination on logistics system. The cost of fresh organic food is relatively high and special requirement is needed for this type of products. Lastly, the standard required for organic food products could inform and ensure the customers about the characteristics of products and the value of products that consumers could expect to receive.

Organic food products both fruits and vegetables are major organic food products desired by Indian customers (Garibay & Jyoti 2003). The information was provided by the key informants that major market in India are in major cities such as Mumbai, Bangalore, Delhi, Chennai and Hyderabad. Most of organic food products were traded via traders, wholesalers, and supermarket chains. Therefore, the Thai farmers have to develop appropriate relationship with their network and ensure their logistics network logistics reliability. The logistics network reliability could be achieved by using four dimensions as guideline, which includes knowledge, linkage, power, and standard required. This could be achieved incorporate with work system and IT to minimise their network obstacles.

Obstacles in Fresh Organic Food

Many obstacles were revealed and posed on fresh organic fruit products to India. Knowing about characteristics of fresh organic food products and its benefits are important. Many consumers do not

aware that fresh organic food products could lift their health healthier. Also, the fresh organic production has high costs, especially labor costs, and the difficulty of shifting from conventional to organic farming are considered as other limiting factors that obstruct consumers to know about fresh organic food. In addition, food availability and seasonality are other limiting factors that make fresh organic food products difficult to establish appropriate retail outlets. Therefore, less number of consumers does not wish to purchase organic food products as consuming higher price of food product can cause their monthly expenditure to be higher.

Conclusion

The number of consumers of organic food products tends to be increased. However, characteristics of consumers that consume organic food products are older people, have high level of educational degree, high level of health consciousness, and have high purchasing power (Krystallis & Chryssohoidis 2005). This profile is similar in consumers' profile and generalisable with other studies in the western countries on organic food consumers (Creswell 2012). The number of Thai farmers is increased as they see opportunity in this market. The farmers move onward to serve the international market, which includes India in this study. In order to meet the standard and requirements of customers in India, these Thai farmers or producers have to be strict on characteristics and standards of fresh organic food products such as the International Federation of Organic Agriculture Movements (IFOAM) (Geier 2007). To producing fresh organic food products, the farmers have to grow farm products strictly to ensure the consumers that they would consume quality products at their wills. The information derived from the key informants in this preliminary study indicated that appropriate logistics network could lead to an improved business performance (Dejsakulrit 2013; Mingmalairaks 2011). The key informants informed that the four components leading to logistics network comprised with knowledge, linkage, power, and standard required.

This study informs that consumers were willing to pay for the price of a 'safety' food, which they can find from the organic food, if the products were produced at the standard. The organic food could help them to be healthier. The achievement of this study provides key understanding to improve the logistics network management, which lead to a competitiveness for business operations. This would facilitate both farmers or organic food producers and their logistics network to enhance their capabilities to efficiently distribute their products to their customers in their target market. Consumers understand characteristics of organic products; hence the fresh organic products could be sold at a premium price because of the quality of fresh organic fruits produce. This preliminary study informs that to enhance logistics network for fresh organic food to India market will need to highly concern in four component areas, which are knowledge, linkage, power, and standard required. This study is then can be generalised with previous studies (Creswell 2012).

Theoretically this paper has shown that by understanding the process of business operations and logistics network strategy creation enabled more in depth understanding of how to enhance business performance in the fresh organic food products. The result of this study provides guide for businesses that exports fresh organic food to India to be able to use safe and reliable logistics (Peng et al. 2011). In this highly competitive environment, Thai organic food businesses could manifestly operate their business whilst appropriate logistics system establishment, better flow of communication and lower cost could be achieved (Bourlakis & Bourlakis 2004; Claiborne 2004).

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THE EFFECTS OF SCM DRIVERS ON SCM FACILITATORS AND SCM PRACTICES: A STUDY OF THAI SMES

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Introduction

Firm today aims to deliver their products and services to their end-customer with new and more effective processes through the concept of supply chain management (SCM) (Poirier and Reiter, 1996). The SCM study includes the management of inter-organisational operations (Chen and Paulraj, 2004) and supply chain alignment (Wong et al., 2012), the process integration in supply chain (Yu et al., 2013), the partnership model (Lambert et al., 2004) and the information sharing (Lee and Whang, 2000, Li et al., 2006). The SCM study has been of substantial importance since mid 1980s (Cooper et al., 1997) and has recently become a topic of increasing interest to practitioners and academic researchers (Ardalan and Ardalan, 2009). While a lot of research on SCM has focused generally on larger firms or from larger organisations' perspective, this paper focuses on SCM in the context of Small and Medium Enterprises (SMEs).

SMEs are generally acknowledged as the elemental format for industrial and commercial development in most countries (Carson et al., 1995). Thai SMEs create jobs and contributes to Thailand's economic growth and enhances country's rural development (Thailand Business News, 2010). SMEs have realised that good SCM strategies are vital in order to compete under current complex and aggressive business environment to provide quality, time and cost advantages products and services (Thakkar et al., 2008).

The objective of this study is to identify, classify and prioritise key SCM drivers and SCM facilitators that supply chain practitioners must leverage to gain the benefits of SCM practices. Dittmann (2013) discussed the importance of SCM practices as a source of competitive advantage. For this advantage to be realised, firms must be properly organised and include SCM as part of the total business planning process. Therefore, the study also aimed to reveal the alignment and relationship among these SCM drivers, facilitators and practices. Having identified some of the supply chain challenges facing SMEs in Thailand, the research could define some supply chain strategies that the government and its agencies responsible for SMEs, and SMEs themselves may adopt. Such an understanding of SCM practices should be delivered through an establishment standard for the success and sustainability of SMEs in Thailand. The result of the study can be adapted to other developing countries.

Literature reviews

The literature supporting reasons of SCM implementation in SMEs may be classified as SCM drivers and SCM facilitators (Yardpaga et al., 2013). They may be termed SCM antecedents (Mentzer et al., 2001). As SCM may be implemented in different practices and have different impacts on firms' performance (Mentzer et al., 2001), this section will also review the literature related to SCM practices and its antecedents. In order to better understand the phenomenon, not only the relationships were explained but how the SCM drivers exerted it effect on SCM practices. Therefore, the mediation concept is also reviewed.

SCM practices and its antecedents

SCM drivers are strategic factors that help to determine an appropriate level of supply chain management practices. While SCM facilitators can be ideas, tools, actors and organisations that usually enhance supply chain implementation. For example, Mentzer et al. (2000) use the term "enablers" as the same meaning of facilitators, which include people, organisation and technology that

move SCM forward. (Mentzer et al., 2000, Mentzer et al., 2001, Bayraktar et al., 2009, Goh and Pinaikul, 1998, Fawcett et al., 2008, Fawcett et al., 2009, Tan et al., 2006).

SCM practices is a set of effective activities across the supply chain network. Cooper et al., (1997) explains framework of SCM that consists of business processes, management components and the structure of the supply chain. Process approach is the focus of every activity to meet customer's requirements. SCM practices, which embrace process approach, are integrating process across functions to produce a specific output for a particular customer or market. The Global Supply Chain Forum (GSCF) develops a process-based supply chain management framework, such as

- Customer relationship management
- Supplier relationship management
- Manufacturing flow management
- Product development and Commercialisation (Cooper et al., 1997)

In each process, this study will examine the supply chain flows including material flow, information flow and resources flow (Mangan et al., 2008).

Mediation analysis

Mediators are the intervening variables that are located causally between a predictor and a criterion (Baron and Kenny, 1986). Frazier et al. (2004) cited that mediators demonstrate "why" or "how" one variable predicts or induces an outcome variable. More specifically, a mediator is defined as a variable that explains the relationship between a predictor and a criterion. For example, Vickery et al. (2003) studied the top 150 independent first tier automotive suppliers to the big-three in North America and argued that the customer service was meditate the relationship between supply chain integration and firm performance.

Research methodology

To achieve the research objectives, i.e. developing SCM practices for Thai SMEs, the following research methods have been used. Firstly, literature reviews of both antecedents and consequences constructs that related to supply chain management practices is to be examined. Then, an empirical study of SCM implementation by using semi-structured interview has been conducted. The semi-structured interview has been widely adopted with deductive approach, as it is considered as the favoured strategy in business and management research (Saunders et al., 2007). An interview guide is prepared in order to confirm that the information obtained from experts are identical. The interviews are conducted with both SMEs and large firms in the same supply chain to verify SCM practices along the supply chain network. Resulting from the interview, mapping the practices and literatures has been framed as SCM practices for Thai SMEs with construct as in Figure 1

Figure 1 Relationship of SCM drivers and SCM facilitators to SCM practices

The methods used to investigate logistics and supply chain management were normally quantitative (Gammelgaard, 2004). This research employed mixed methods, integrating qualitative and quantitative research. The methodology entailed obtaining information directly from a group of individuals (Dane, 1990).

The purposive sampling was applied to this study because the researcher had a clear idea of the sample units needed (Saunders et al., 2007). Samples were selected from the members of The Federation of Thai Industries (FTI). The researcher selected only firms that fit the criteria of small and

medium size firms' definition, which have been classified by the number of full time employees. According to the definition of SMEs from The Federation of Thai Industries (FTI), the size for small business (S) is typically 50 or fewer employees, the size for medium business (M) is 51 to 200 employees and more than 200 employees will be classified as large business (L).

After four weeks of sending out the questionnaires, we got 129 responding answered questionnaires. Then we sent out two waves of reminding letters in the following months at four weeks interval. Finally, the survey produced 311 valid responses, resulting in a response rate of 11.5 per cent. This response rate was comparable to the previous study of SMEs in Thailand context, supply chain management – SMEs approach (Udomleartprasert et al., 2003) and provided adequate data for further analysis.

The nonresponse bias was examined by testing for statistically significant difference between early and late responses. The questionnaires returned after the last remind were considered the proxy for non respondents, while the early returned questionnaires were appraised as proxy for respondents (Arend and Wisner, 2005). The statistical *t* tests based on two groups showed non-significant results for the means of independents and dependents variable. The characteristics of respondents and their businesses are summarised and presented in table 1.

Demographic characteristics	Number of firms	Percentage
Number of year in operation		
• Less than 5 years	94	30.2%
• 5 to 10 years	104	33.5%
• More than 10 years	113	36.3%
Number of employee		
• Micro (Less than 25)	95	30.5%
• Small (25 to 50)	71	22.9%
• Medium (51 to 200)	145	46.6%
Total	**311**	**100.0%**

Table 1: Characteristics of respondents and their length in business operated

Findings

To confirm the effects of SCM drivers on SCM facilitators and SCM practices, the mediating relationship is explored according to Baron and Kenny's *casual steps strategy* (Preacher and Hayes, 2008). A mediating relationship happens when some variable influences the relationship between two other variables (Howell, 2002). According to our interviews, higher perception of SCM drivers leads firms to increase their SCM facilitators so as to gain a higher level of SCM practices. It was also explained in the interviews that SCM facilitators mediate the relationship between SCM drivers and SCM practices. The path diagram of the relationship, depicting a causal chain, is shown in Figure 6-1. This model shows two causal paths feeding into the outcome variable (SCMP): the direct impact of the independent variable (Path *c*) and the impact of the mediator (Path *b*). There is also a path from the independent variable to the mediator (Path $\boldsymbol{a}$)

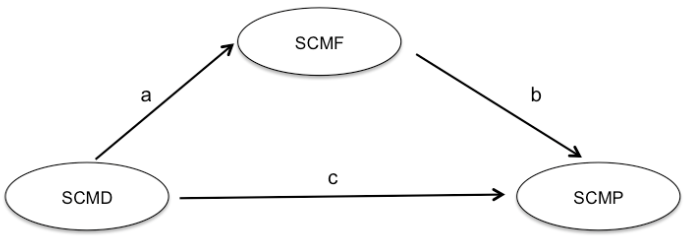

Figure 2: Mediator relationship path diagram

SCMF functions as a mediator when it satisfies the following criteria (Baron and Kenny, 1986):
(a) variations in the level of SCMD significantly accounts for variations in SCMF;
(b) variations in SCMF significantly account for variations in SCMP;

(c) when Path ***a*** and ***b*** are controlled, a previously significant relation between SCMD and SCMP is no longer significant, with the strongest demonstration of mediation occurring when Path ***c*** is zero. Furthermore, when Path ***c*** is reduced to zero, it can be concluded that a model has a single, dominant mediator. However, the most likely occurrence is that Path ***c*** is not zero but instead becomes weaker but still significant.

To satisfy these initial conditions of Baron and Kenny, Table 3 shows simple correlations among SCMD, SCMF and SCMP. The results demonstrate that SCMD is correlated with SCMF and with SCMP, and SCMF is also correlated with SCMP. These relationships satisfy Baron and Kenny's basic prerequisites. The next step is to use both SCMD and SCMF as predictors of SCMP. This is shown in Table 2

Correlations

	SCMD	SCMF	SCMP
SCMD	1	0.715**	0.462**
SCMF	0.715**	1	0.450**
SCMP	0.462**	0.450**	1

Table 2: Correlations among variables
Note: ** Correlation is significant at the 0.01 level (2-tailed).

Coefficients

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.873	0.3		2.906	0.004
	SCMD	0.657	0.072	0.462	9.146	0.000
2	(Constant)	0.494	0.315		1.569	0.118
	SCMD	0.406	0.101	0.286	4.026	0.000
	SCMF	0.345	0.099	0.246	3.472	0.001

Table 3: SCMP coefficients
Note: Dependent Variable: SCMP

In this situation the direct path from SCMD to SCMP remains significant, and the mediating path from the independent variable to the mediator to the dependent variable has to be tested for significance. The regression coefficients and their standard errors for the paths in the mediating chain are shown in Table 4.

Path ***a***			Path *b*		
SCMD	→	SCMF	SCMF	→	SCMP
$\boldsymbol{\beta_a}$		0.7262	β_b		0.3449
$\boldsymbol{S_a}$		0.0404	$\boldsymbol{S_b}$		0.0993
t		17.9761**	t		3.4721**

Table 4: Regression coefficients and standard errors for the two parts of the mediating path
Note: ** Significant at the 0.01 level (2-tailed).

The regression coefficient for the path SCMD → SCMF → SCMP is equal to β_aX β_b, where a and *b* refer to the relevant paths. (Path *c* is the direct path from SCMD to SCMP.) The standard error of this two-part path (Howell, 2002) is given by

$$S_{\beta_a\beta_b} = \sqrt{\beta_a^2 S_b^2 + \beta_b^2 S_a^2 - S_a^2 S_b^2}$$

where β_a and β_b are the paths, and S_a and S_b are the corresponding standard errors of the standardised regression coefficients for those paths. The standard error of the combined path is calculated as:

$$S_{\beta_a\beta_b} = \sqrt{\beta_a^2 S_b^2 + \beta_b^2 S_a^2 - S_a^2 S_b^2}$$

$$= \sqrt{0.7262^2(0.0993^2) + 0.3449^2(0.0404^2) - (0.0404^2)(0.0993^2)}$$
$$= \sqrt{0.0054}$$
$$= 0.0733$$

The path *c* coefficient is calculated by multiplying the beta values of path *a* and path *b* (0.7262 X 0.3449 = 0.2505). Dividing by its standard error (0.0733) gives the *t* ratio:

$$t = \frac{\beta_a \beta_b}{S_{\beta_a \beta_b}} = \frac{0.2505}{0.0733} = 3.42$$

According to Sobel (1982), this *t* value is asymptotically normally distributed for large samples, and would lead to the rejection of the null hypothesis at α = 0.05 when the value exceeds ±1.96. In this study the path is clearly significant as confirmed by our interview findings. Therefore, it can be concluded that there is a convincing evidence of a strong mediating pathway from SCMD through SCMF to SCMP.

Conclusions

The research applied the *causal steps strategy,* familiarized by Baron and Kenny (1986), in which the researcher estimated the paths of the model using ordinary least square regression and determined the degree to which several conditions were met. The results of the study revealed that there was a convincing evidence of a strong mediating pathway from the SCM drivers through the SCM facilitators to the SCM practices. This urged researchers to be more sensitive to the statistical data analysis technique used (Hayes, 2013). It contributed to conceptual clarity in summarising empirical study.

The study examined causal relationship of supply chain management practices in Thai SMEs context. The model was developed from literature review and confirmed by supply chain executive experts through interviews. In general, data from self-responded questionnaire survey provided empirical evidence supporting the causal model. This study appears to confirm that the antecedents of SCM, which include SCM drivers and SCM facilitators, have a significant relationship to SCM practice for Thai SMEs. This research attempted to enhance the understanding of how Thai SMEs perceived with supply chain management.

This study, like others, has limitation. The list of members of The Federation of Thai Industries (FTI) was used as representative of Thai SMEs; thus, the results are generalizable only to the extent that FTI members resemble the population of Thai SMEs. The response rate was also somewhat low; however given the subject matter and complexity, this is reckoned acceptable. Another limitation of this study is the use of respondents from various industries. It should be accepted that different supply chain environment in each industry could impact the respondent's answer to the questionnaires. The focus research from particular industry may solve this issue but it makes the results less generalizable.

The extension of this study can be conducted by doing sample case analysis within Thai SMEs to achieve higher understanding of how supply chain management practices are implemented, which exact SCM drivers and SCM facilitators are involved by these SCM practices, and what are the performance outcomes from them.

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HALAL LOGISTICS IMPLEMENTATION IN THE CONTEXT OF ASEAN LIBERALISATION: A LITERATURE REVIEW

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Introduction

Within the last two decades, an obvious trend of development and consistent evolution can be observed in logistics (Gundlach et al., 2006). It is being considered as an industry with strategic role, and not as a supportive industry (Sum et al, 2001). This importance of logistics industry has been increasing because of globalisation of many countries and expansion of international trade etc. As per recent statistics and forecasts, there is a huge chance of growth in Asia Pacific region (Sun et al., 2001). The dramatic expansion in the trade with countries in this region i.e., Indonesia, Thailand, Malaysia and Singapore has resulted in an increased demand for better, effective and efficient logistics. The Halal market is the biggest market in the world but is largely overlooked. The Ministry of International Trade and Industry Malaysia (MITI) categorized the Halal market into three categories, namely food, non-food (pharmaceuticals, toiletries, medical products, medical devices, and cosmetics) and services (logistics, packaging, branding, marketing, media coverage and tourism), thus valuing the Halal market at a staggering US$2.3 trillion. This is contributed by the dominance of Muslim population (Adams, 2011), the gaining acceptance among non-Muslim consumers (Golnaz *et al.*, 2010; Aziz and Chok, 2013), increased awareness on Halal products and services (Bonne *et al.*, 2007; Bonne and Verbeke, 2008) and Halal is becoming a lifestyle (Lada *et al.*, 2009).

As mentioned earlier, one of the Halal markets is logistics, commonly termed „Halal logistics", and it is an emerging trend (Kamaruddin *et al.*, 2012). Besides, there are many logistics service providers (LSP) in Malaysia are adopting Halal in their operations (Jaafar *et al.*, 2011; Talib *et al.*, 2013) and the Malaysia government, in its Third Industrial Master Plan (IMP3) 2006-2020, listed Halal logistics as one of the potential business to stamp Malaysia"s mark as the preferred Halal hub in the world.
The objective of this study is to examine the relevant literature and discuss the issues related to Halal logistics industry in Malaysia, after the ASEAN liberation. The Halal logistics industry in Malaysia will be evaluated from the politic, economy, social and technology factors.

Background of Logistics and Supply Chain in Malaysia

There is a limited research on management of logistics and supply chain management in the context of Malaysia. It seems like companies in the past were unaware of the advantages of having an effective and efficient distribution system and therefore, no efforts were made to develop effective distribution strategies. However, the transformation of economy from agriculture-based to a trade-driven based as well as the development of international trade within the last decade has stimulated awareness that transport and logistics sector plays a critical role in facilitating the country"s economy (MIMA, 2004).

A recent report highlighted that Malaysia has the opportunity to create an additional value of about RM9-11 billion over the next decade, which contributes approximately 12.1% to the GDP, if the supply-chain competitiveness is improved through more efficient transport and logistics services. The report also emphasised that by reducing the supply chain cost will ultimately stimulate further national growth as the World Bank has estimated that a 10% reduction in transportation costs can increase trade by 20% (Ali et al., 2008). Similarly, McKinsey Global Institute who studied productivity improvements in various industry sectors around the world, indicated that such efficiency improvements are likely to translate into a GDP growth effect of at least the same order. Consequently, this creates a virtuous and perpetuates effect on the economy.

Various incentives have also been introduced by the government. One of the incentives is Integrated Logistics Services (ILS) incentives. The purpose is to encourage logistics service providers to consolidate or integrate their activities to include other services as well as encouraging them to venture into business abroad (MITI, 2008). As at December 2013 a total of 33 companies have been granted the Integrated Logistics Services (ILS) incentives, which amounted to RM880.5 million (MITI, 2014). As a result of an active development of the industry, at the end of year 2013, the industry, which comprises of transport, storage and communication services contributed more than 5.0% to the country"s GDP.

Third Industrial Master Plan (2006-2020) (IMP3)
Recognising the significance of the halal logistics sector towards the enhancement of Malaysia"s progress in industrialisation and international trade, the role and importance of the halal logistics industry has been officially mentioned and highlighted in the Third Industrial Master Plan (2006-2020) (IMP3, 2005). The targets underlined by the government includes the achievement of overall growth of 8.6% by the year 2020, which is equivalent to approximately 12.1% contribution to the GDP; to increase the total marine cargo by more than three-fold, air cargo trade by more than two-fold and railway freight by more than four-fold in the year 2020.

Liberalisation of Logistics Sector under Association of Southeast Asian Nations (ASEAN)
Under the Association of Southeast Asian Nations (ASEAN) a liberalization program of the logistics service sector has been agreed among the member countries. This program creates an ASEAN single market by 2015; strengthening ASEAN economic integration through liberalisation and facilitation measures in the area of logistics services and supporting the establishment and enhancing the competitiveness of an ASEAN production base through the creation of an integrated ASEAN logistics environment (EUMCCI, 2011). Specific measures and timelines for integration, liberalisation and facilitation of the logistics sector have been outlined in the ASEAN Roadmap for Integration of Logistics Sector, which includes:

- The coverage of logistics services for liberalisation;
- Issues related to trade and customs facilitation;
- Expanding the capability of ASEAN logistics service providers;
- Human resources development; and enhancing multimodal transport infrastructure investment.

The liberalization requires Malaysia to strengthen its logistics industry, the capabilities of the logistics players and the multi-modal transport infrastructure in order to attract FDI in logistics and trade to Malaysia in future. Due to its excellent location, transportation infrastructure and availability of land, Malaysia would be the preferred location for an Asia Regional Distribution Centre allowing for value added logistics (VAL). As one of ASEAN"s leading logistics hubs, Malaysia is expected to lead green logistics initiatives in ASEAN. The Ministry of International Trade and Industry (MITI) are taking responsibility to meet the liberalisation targets under ASEAN (MITI, 2007; 2008).

Halal Logistics in Malaysia
According to Mentzer *et al.* (2001), logistics is part of supply chain process that plans, implements, and controls the efficient flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers" requirements. Lambert *et al.* (1998) state that the objective of logistics management is to achieve customer satisfaction by ensuring that product or services are made available at the right time, in the right quantity, with the right description and in good condition. Since there are concerns on the status and integrity of Halal products and services, the customers are demanding for logistics services that can ensure the Halal status remains intact even during distribution activities. Hence, Smith (2007) explains that Halal products and services depend on the Halal logistics functions such as transportation, warehousing and packaging. Smith continues that the success of Halal logistics will contribute to the overall growth of Halal industry.

The acceptance of Halal logistics is highly welcomed in Malaysia as not only it is a Muslim country, but the strong government support also contribute to the large acceptance. Omar and Jaafar (2011) and Kamaruddin *et al.* (2012a) stated that Halal logistics is a lucrative business. Furthermore, logistics service providers LSP are also adopting Halal into their operation, by dedicating assets, facilities, procedures and manpower. Jaafar *et al.* (2012) reported that LSP are innovative in combining Halal and logistics operations such as *samak* (ritual cleansing) services for containers, dedicated cold-storage, dedicated warehouse, Halal-specialized carriers and Halal-only tools and equipment. These various services are indications that LSP and Halal LSP are dedicated towards establishing a total Halal logistics services here in Malaysia (Talib *et al.*, 2013).

Although Halal logistics is gaining grounds among LSP and consumers, there are issues encountered (Kamaruddin *et al.*, 2012a; Talib *et al.*, 2013). For instance, the Halal logistics faces challenges in the form of lacking enforcement and monitoring, inadequate Halal standards, low credibility and low level

of centralization (Kamaruddin *et al.*, 2012a). Besides, Talib *et al.* (2013) discover that the LSP perceived Halal logistics associates with higher cost as it requires different sets of equipment, facilities and assets. However, there are many academic and professional research performed in the Halal logistics related fields such as, training in Halal logistics (Pahim *et al.*, 2012a and 2012b), Halal transportation (Tan *et al.*, 2012), willingness to pay for Halal logistics (Kamaruddin *et al.*, 2012a), Halal packaging (Talib and Johan, 2012), and food supply chain (Halaseh and Sundarakani, 2012; Manzouri *et al.*, 2013).

External Environment and Factors effecting Halal Logistics

An external environment is the general environment, or sometimes is referred to as macro-environment (Mohamed *et al.*, 2010), that directly or indirectly influence firms in an industry. Additionally, external environment evaluation is also referred to as PEST Analysis (Ward and Rivani, 2005). A PEST Analysis is a shortening for political, economic, socio-cultural and technological analysis. Like PEST Analysis, assessing the environment from politic, economic, social, and technology perspective, an external environmental evaluation gives a „satellite view" of an industry and also a tool used to monitor trends, opportunities or threats (Pulaj and Kume, 2013). Following are a few issues related to Halal Logistics Industry considering political, economic, socio-cultural and technological factors.

Political Factors

The role of government is apparent in logistics industry as political interventions, such as developing key logistics infrastructure, will accelerate the growth and development of logistics industry (Goh and Pinaikul, 1998). In Malaysia Halal logistics industry, the political or governmental factors can be seen from various efforts such as tax incentives, financial supports, certification and guidelines (Ramli, 2006; Muhammad *et al.*, 2009; Tan *et al.*, 2012; Talib, 2014). Apart from that, examples of government role in Halal logistics include planning, developing, implementing, regulating, promoting and educating Halal (Samsi *et al.*, 2011). In the IMP3 2006-2020, the Malaysia government encourage LSP to adopt Halal into their operation by offering tax exemption, tax drawbacks and double deduction (MITI, 2006). Tan *et al.* (2012) described this initiative as encouragement for new investment, as well as in increasing the use of information communication technology (ICT) in Halal logistics. Furthermore, government supports come in the form of introducing and applying Malaysia Standards for Halal logistics, the MS2400:2010, and other Malaysia Halal Certifications. According to Talib (2014), government support also comes in the form of policies, procedures and guidelines. The government efforts have managed to position Malaysia Halal Certification as the most reliable standards, and Malaysia is known for its Halal certification (Muhammad *et al.*, 2009). Moreover, the development of Halal logistics infrastructure by the government is an indication of political factor, thus consistent with the work done by Goh and Pinaikul (1998). For instance, the Malaysia government established Halal Park and Halal Distripark to cater for Halal product and services, including Halal Logistics. However, the political factor from the government can also be a threat. For example, fake Halal certification and lack of standardization are problems in Halal logistics as it will lead to confusion and doubt among consumers (Shafie and Othman, 2006; Iberahim *et al.*, 2012). Besides, the process of applying new or renewing Halal certification are inefficient, tedious, time consuming and very costly (Abdul *et al.*, 2009; Noordin *et al.*, 2009). Although many efforts have been put into action to curb these issues, they are still pertinent and a threat in the Halal industry.

Economic Factors

Malaysia is blessed with strategic location, good external trade, and strong government support, and this leads to strong logistics industry forecast by Frost & Sullivan that predict Malaysia"s logistics industry growth was US$45.1 billion in 2013. A strong economic and industry growth is one of the aspects in economic factors (Mohamed *et al.*, 2010). Furthermore, the total Halal market, comprises of food and non-food market, is valued at US$2.3 trillion (MITI, 2013). This is a very good indication for LSP to adopt Halal in their operations and it is also a good avenue for Halal logistics in Malaysia to become a global Halal hub. Furthermore, Talib (2014) suggests that Halal LSP should target the ASEAN Free Trade Area (AFTA) for transporting or distributing Halal goods. This is because ASEAN market is very promising as between the year 2010 and 2013, the Intra-ASEAN trade among the participating countries recorded growth and was valued at US$598 billion, and Malaysia holds one of the largest total trade values of US$108 billion. (MITI, 2013).

Social Factors

The acceptance of Halal products and services among Muslims and non-Muslims is because of the perception that Halal is a symbol of a healthier lifestyle and clean preparation (Ambali and Bakar, 2013; Aziz and Chok, 2013). This consumer inclination towards Halal is an indication that Halal logistics trend is on the rise and more business customers and consumers are willing to pay for Halal-compliant logistics services (Kamaruddin *et al.*, 2012a). The response from the public has led Halal LSP to invest is Halal-dedicated assets such as Halal warehousing, Halal seaport, Halal transportation and carrier, Halal-only equipment, Halal audit teams, Halal tracking, and steam/*samak* services (Jaafar *et al.*, 2011; Kamaruddin *et al.*, 2012b; Talib *et al.*, 2013). Furthermore, a threat worth mentioning is the lack of talent and knowledge of Halal logistics. Talib *et al.* (2013) states the scarcity of talent and knowledge about Halal and logistics combined is an issue need to be addressed. Knowledge of both Halal and logistics must be hand-in-hand in order to achieve incomparable Halal logistics services, but as mentioned earlier, there is lack of professionals in logistics industry.

Technology Factors

Information technology (IT) in logistics helps to improve productivity of LSP, enhance the effectiveness and efficiency level, and even help to position a country to become a logistics hub (Piplani *et al.*, 2004; Hazen and Byrd, 2012). This is an indication that use of IT is also vital in Halal logistics, and Halal LSP must grab this opportunity as it is gaining interest and a lucrative business (Mazlan, 2005; Zailani *et al.*, 2010). According to Bahrudin *et al.* (2011) and Tan *et al.* (2012), the tracking and tracing activities in Halal logistics is part of IT and it enhances the service integrity. Therefore, the applications of IT in Halal logistics benefit both the service providers and consumers. Moreover, Transportation Management System (TMS), Warehouse Management System (WMS), Electronic Data Interchange (EDI) and Global Positioning System (GPS) and Radio Frequency Identification (RFID) are examples of IT application used in Halal logistics (Bahrudin *et al.*, 2011; Nasir *et al.*, 2011; Tan *et al.*, 2012). For instance, the use of RFID in Halal logistics can help strengthen Malaysia status as the world Halal hub (Norman *et al.*, 2009). However, issues such as resistant to change and false perception on Halal logistics adds in more costs can be threats to the Halal logistics success. Tan *et al.* (2012) expressed that organizations are resistant to adopt IT in Halal logistics activities while some are used to the traditional way of short message services (SMS) for real-time tracking (Anir *et al.*, 2008). Besides, the issue of IT compatibility exists among LSP and this cause service inconsistency (Tan *et al.*, 2012).

From the literature discussed above, Figure 1 showcases the external factors of Malaysia Halal logistics industry. There are six factors for politic and social factors, and only four factors for economic and technology factors. It must be noted that the factors shown are not fixed and may change as the external environment is constantly changing.

Conclusion

The objective of this study is to examine the relevant literature and discuss the issues and opportunities related to Halal logistics industry in Malaysia. This study reviewed the related literature and examined the factors that are related to Halal logistics in Malaysia considering the main four external environment dimensions including political, socio-cultural, economic and technological. This study discovered seventeen (17) factors that externally impacting the Halal logistics industry in Malaysia and divided them based on four (4) external environment dimensions. Hence, this study appraises the knowledge of environmental analysis and contributes to the Halal logistics body of knowledge. Despite of the remarkable expansion of the industry, there has been very little published research in the area of logistics and supply chain particularly in Malaysia – a Muslim majority country observing Halal way of life (Ali et al., 2008). Halal is a Muslim way of life, and it is not only limited to Muslims" dietary but includes speech, behaviour, dress code and social manner (Al Jallad, 2008). This study is significant for researchers and professionals in order to have more knowledge on the environment and surroundings. This study is hopeful that it will be a reference and a platform for more research in the future.

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The Reformation of Environmental Fiscal from External Cost of CO emission of the Logistic Vehicles for the Development of Green Logistic Infrastructure

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Abstract

***Purpose of* research**: The study on the environmental fiscal of the external cost or Damage Social Cost is to provide a platform of the financial aid or assistance for the redevelopment of damaged environments due to the negative externality produce by logistic vehicles. This study identifies the external cost and the reformation of the damaged cost as the instrument of environmental fiscal for the redevelopment of damaged environment.

Methodology: This study will be based on the Marginal Cost Approach (MCA) and the Cost Benefit Analysis (CBA) of Social Cost of Carbon Emission in UK and Malaysia road tax 2009 to establish the external cost in Malaysia context. The survey and observation were carried out along the road 64km road from Noth Port Klang to Free Commercial Zone (FCZ), KL International Airport (KLIA) and the road were identified by the Department of Environment Malaysia (DoE) as most polluted and intensively used by the logistic vehicles. The result of three (3) day survey along North Port to FCZ KLIA to be used as a source for the reformation of external cost. The equipment, called CALINE4 being used to measure the CO emission released by logistics vehicles. The CO emission collected data to be used for formulating the external cost for reformation of environmental fiscal.

Findings: Influencing factors of this study is the MCA and CBA that used as reference to develop the social cost or external cost. The equipment used to measure the dispersion from the line source and collected data from various types of vehicles. In additional the background of the survey area surrounds by oil palm factory, paper factory and other development activities.

***Research Implicatio*n:** This research fills in the gap by establishing the external cost in Malaysia for the redevelopment of environment and as the benchmark cost for the reformation of financial assistance that can be used by DoE to establish the environmental fiscal. It is also as a head start for the government to establish financial institutional based from the external cost which is still not being identified as one of the sources for the redevelopment or new development of the environment towards a Green Economy.

Practical implicatio*n*: Since Malaysia towards reducing the CO emission and towards the green economy for the sustainable future, this research will give an idea to the policy makers and also one of economy instruments for the development of Green Economics.

Originality/value of research: This paper highlighted that the reformation of Environmental Fiscal is essential that helped government to establish the financial assistance for the sustainability of the environment, social and economic through the external cost.

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Keywords: External Cost, Environmental Fiscal, Marginal Cost Approach, Cost Benefit Analysis

Introduction

The logistics vehicles being used to deliver a different kind of goods, equipment, material, etc. and depends on a demand of a customer for the product. Normally, in Malaysia the logistic vehicles comprise of Heavy Weight Truck, Light Weight Truck, Van etc. Those vehicles used fossil fuel that release CO emission from the vehicle movement activities that produce negative externality to the environment. The mode of delivery of the products starts from the operation of delivering raw material to the manufactory, operation of warehouse, material handling, distribution, etc. The traditional way of logistic services are through several network systems such as Just in Time, Door to Door Delivery, Milk Run, Multi model network etc are among the system being used in Malaysia. This traditional way of logistic services had incurred substantial cost of subsidies, externality cost, environmental damage, inefficient management and operation while damaging the environment by contributing CO to the atmosphere.

Background of the study

Environmental Fiscal

In developed countries, it is known as a 'tax shifting program' is to raise revenue which can be used for the development of the infrastructure EEA (2005). It is also a significant financial resource for achieving the objective of sustainable development and one of the important tools of market-based instrument for the environmental policy that increase the attention. (OECD, 2006) The reformation of environmental fiscal is shifting the burden of the conventional taxes to environmental damaged activities such as CO emission or pollution from the logistic provider. This concept on the taxation is for the negative externality which influencing and changing the behavior of producers and customer to be more sustainable. The revenue should be for the environmental benefit, which can be used for financial environmental investment S. Stefan (2008). It has a wide concept where the charges of negative external cost of logistic can raise the revenue for the development of Green Logistic infrastructure. The revenue rose from the external cost charged to the logistic provider where other conventional tax is to be reduced or abolish to lesser the burden of the logistic player in the market. The policy measure can achieve the environmental benefit where the revenue to be distributed fairer for development of green logistic infrastructure for the sustainable development and lower the tax burden of logistic player.

Green Logistic

The Green Logistics is a way forward of the modern transportation system using the technologies which improve the efficiency, reliability and operational cost of logistic player as quoted by Rodrigue, Brian, Comtois (2001). Mc Kinnon (2010) highlighted that the Green Logistics is a desire to help the environment for a benefit of society and opposed the growth of the traditional logistics services. The studied on the Green Logistics starts from the operation of warehouse, material handling, strategic routing, outbound and inbound of the goods or product movement from one place to another place. Mc Kinnon (2010) quoted that the essence of the Green Logistics framework comprises of;

- Modal split of the logistics proportion mainly uses the road as the main mode, railway and waterbound.
- Average handling factor is the weight of goods and through the supply chain.
- Average of haul on every length of each link in the supply chain and converted to the tonnes-lifted statics into tonnes/kms.
- Energy efficiency is measured by the ratio of the distance travelling and energy consumed.
- Emission per unit of energy being used and emission of unit gases, which will be varies depending on the type of energy source used, engine technology and driver behavior.
- Other negative externalities of the pervehicles-km and per unit is a noisy irritation, vibration, accident, produce of PM10, health impact, etc.
- Monetary valuation of the externalities comprises of the impact of physical measure into monetary values which is a common metric against the environmental effect and environmental cost covers through taxation.

Many corporate agencies implemented Green Logistics delivery services that use green technology, green vehicles, energy efficiency, reuse, innovative packaging, remade, reverse, Eco driving skill etc. with towards the sustainable future. Even though some believe that implementing the Green Logistics will occur higher operational cost compare to traditional way because it involved the investment on the green vehicle, providing eco driving training to the driver, using LNG gases, centralize the reverse product, repacking system, using multi modal delivery mode etc. However, today world class branded product is responsible with their product that release CO and to align with shareholder, customer, ethical investor, NGO etc that demands the product produce is towards the sustainable environment. Among car maker, consumer goods, electrical and electronic product and pharmaceutical producer are as follows;

Toyota
Recognize their problem and learn to improves further through 'Hansei' is a word that improves the environmental performance and learn through their success and failure. TOYOTA, Green Logistic delivery system played a vital role to align with their objective. This program is to reduce the use of fossil fuel by using multi model mode delivery system through a third party and railway carrier beside of implementing EPA's Smart Way improves their efficiency and cost through the installation of aerodynamic equipment. Eco driving will lesser the idling reduction which reduce the used of fuel around 160,000 gallons or reduce of 1,600 tonnes of Greenhouse gases a year.

TOYOTA environmental initiative 2012 reported that by 2016 they should accomplish CO2 CANCEL with the way forward as below;

- Establish parameter to calculate CO2 reduction volume of each product.
- Provide an estimate to accomplish 'CO2 CANCEL' based on the preliminary calculation result.
- Specify target (including accomplish'CO2 CANCEL)
- Promote activities to achieve the target
- Achieving the targets
- Define higher target of (CO DOUBLE CANCEL)

The target for CO2 CANCEL is to cover the whole operation of the supply chain, power plant station, manufacturing processes, material used, procurement, distribution, use, reuse and disposal which include in time, resource and cost. TOYOTA also establishes the society and Environmental Management System for sustainability of the environment, society and the economy recycling-based.

Nestle
NESTLE objective on the Green Logistics is to reduce the environmental impact of its distribution activity which involves the usage of energy. NESTLE management 2008 reported, the production alone has generated direct emission of CO2 around 4.1mil tonne and indirect emission is about 3.0mil tonne and 95kg of direct CO2 per tonne of product. The distribution activity contributed 41mio tonne of CO2 with an average of transport distance around 800km. The total distance is approximately 2.6bio km per tonne-km with a total run of 32.8bio tonne-km. The use of fuel consumption is 900mio liter with an average of CO2 emission of 72g per tonne km with the total of 2.4mil tonne direct CO2 emissions.

NESTLE initiative towards sustainability by implementing the alternative transport mode, new type of fuel, engine technology, Eco driving skill, etc. Beside of that NESTLE look into the loading factor such as collaborate with other distributor, optimize load capacity with palletization planning. NESTLE also studied possible ways to reduce the emission and focus on various aspects, for example NESTLE Germany and Mexico using an alternative transportation mode, Poland embark on Eco driving skill and telematics, while Thailand redesign the distribution network.

Methodology

The Cost-Benefit Approach(CBA)

CBA primary objective is to calculate socially optimum level of emission through time and to keep emissions at optimum level. The price of emission defined as pollution tax for the polluter. In the cost - benefit framework, to obtained the intersection of the marginal abatement cost and the marginal social damage is when the emission at the optimum level where the incremental social costs of lesser pollution are equal to the additional benefit to social cost. This shows that the society will gained benefit from the reduction of pollution. However, the social cost also depends to the marginal damage of a tonne of carbon emission from the logistic activities that emit the amount of CO to the atmosphere.

The Marginal Cost Analysis (MCA)

MCA to calculate directly the different between future damage levels has caused by the marginal baseline emissions. The damage cost is calculated under the marginal cost is very similar with the Cost Benefit Analysis. Hence, when the damaged caused by a tonne CO depends to the CO concentration in atmosphere. The level of CO concentration is cumulative level of emission or in other words 'a stock of CO' in the atmosphere that determines the amount of damaged caused by additional emission of CO concentration. The emission of CO can be calculated and the cost of emission will be different in future, thus it is necessary to have discount rate because in CBA approach is to convert damages back to the current values. In calculating the marginal cost at the Business as Usual (BAU) and it is important to noted that the marginal damage is assume to be increase and it parallel to the social marginal damage curve. For mitigate the BAU the marginal abatement need to be address to the polluter to ensure that the CO emission can be controlled.

Estimation of the Social Cost/tonne of CO emission

Since IPCC working on the on Economic and Social Dimension of Climate Change and reported based on the literature review of the estimates damage cost produced price within the range of $5 - $125/tonne of CO emission. In some studies shows that generally the produce social cost estimates that increase through time. The relevant cost to be increased between $7 - $154/tonne in year 1990 and by year 2000 is increasing to $9 - $197/tonne. However the existing studies on the damage cost does not represent the confidence but the best guesses the estimate depict damages associate with the climate change. The studies by Nordhaus (1991) and Ayres and Walter (1991), shows that the social cost of CO emission increases through time. The fact is that the damage is consistent and much dependent to the stock of CO in the atmosphere and the rate of economic growth. Thus, CO concentration levels in the atmosphere likely not to be stabilized until to the next century. Even though aggressive global abatement strategy and effort to mitigate the CO emission with assume to that the effect will outweigh any reduction in damage due to improve adaptation.Table below is the associated marginal damage estimates or social cost, these cost also known as external cost in different decades as reference for this study. Source et al C. Richard & D.Kathryn (2002)

The Social Cost of CO2 emission in different decades ($/tC in 2000 prices)

Study	Type	1991 - 2000	2001 - 2010	2011 - 2020	2021 - 2030
Nordhaus (1991) p =1% p = (0%,4%)	MC	9.9 (3.0 - 194.9)			
Ayers & Walter (1991)	MC	38.4 - 44.8			
Nordhaus (1992 - 1994b) p = 3% Best guess Expected value	CBA	7.16 16.2	9.2 24.3	11.6 24.3	13.5
Cline (1992 , 1993) S = 0% - 10%	CBA	7.8 - 167.5	10.3 - 208.0	13.2 - 251.2	15.9 - 298.5
Maddison (1994) S = 5%	CBA/MC	8.0 8.2	10.9 11.3	15.0 15.5	19.9 20.5
Fankhauser (1994) P = 0%, 0.5%, 3%	MC	27.4 (8.4 - 61.0)	30.8 (10.0 - 71.4)	34.2 (11.2 - 78.9)	37.5 (12.4 - 86.7)
		1995 - 2004		**2005 - 14**	
Eyre et al. (1999)/ Tol (1999a)[23]	MC	FUND 1.6	OF	FUND 1.6	OF
S=1% Best guess: Equity weighted No equity weight		255 109	244 110	259 119	264 120
S=3% Best guess: Equity weighted No equity weight		109 42	116 53	117 49	137 63
S=5% Best guess: Equity weighted No equity weight		57 20	57 20	65 25	97 47
		2000 - 2009			
Tol and Downing[24] (2000) p = 0%: Best Guess p = 1%: Best Guess p =3%: Best Guess	MC	VLYL 15.9 9.4 4		VSL 29 13.2 1.4	

Notes
CBA = shadow value in a Cost Benefit Analysis study
MC = marginal cost study
S = Social rate of time preference
P = Pure rate of time preference

Most of the studies in the table discounted damages back to the time of emission. Where studies discounted damages back to a common year, have been adjusted to the time of emission, in oeder to enble comparison between result

Figure 1

From the above discussion, in Malaysia context to implement the Green Logistics start from measuring the CO release by the logistic vehicles. In order to know the value of CO released by logistic vehicles and its impact, a survey and observation on this has been carried out by identifying the road actively used by the logistic vehicles. After meeting with Department of Environment (DoE) the most polluted road heavily used by logistic vehicles is the road from North Port, Klang to Free Commercial Zone, KL International Airport as shown in Figure 2.

Figure 2

Data Collection

The map above highlighted the 64km length of road from North Port, Klang (NPK) to Free Commercial Zone KL International Airport (FCZ, KLIA) surrounded with residential, industrial and small township area. The three (3) days survey for the purpose collecting CO data release by logistic vehicles used the road by locating five (5) stations with the distance 15km station from each as shown in Figure 2 below. CALINE4 has been used to measure CO, remote sensing and calculation tool to count the numbers of vehicles pass through every each station.

The collected data used a mathematical equation in measuring the dispersion of chemical and physical processes where CALINE4 IS BASED ON Gaussion Models which measure vertical and horizontal dispersion of the plume as cited in Holmes and Morawaska (2006). It also calculates the CO emission from the line source and require an input of surrounding background environment from meteorological parameter, traffic flow, road alignment geometry, distance of each station and the x, y factor for the GPS coordination system. The used of CALINE 4 (Link Element Algorithm), divide every each highway link in the series of total summed of concentrations estimate perpendicular to the reception location measured along the center line. The 1^{st} element is E O is formed to be square and the side is ^{0}an equal to the highway road width and determines the roadway wind angle, PHI. If PHI $< 45^0$ means that the center of an element is to located directly to upwind of the receptor. If PHI $> 45^0$ means that the location of E O remains constant and equal its position at PHI = 45^0. This will position of E O and helps to achieve smooth model respond to the receptors and nearest link. Thus, the formula will determine the position and length of the subsequent elements:

$$EL = W^{*} \text{Base}^{NE}$$

Where,

EL = Element Length
W = Highway Width
NE = Element Numbers
BASE = Element Growth Factor

And

$$BASE = 1.1 + \frac{PHI^{3}}{2.5 \times 10^{5}}$$

Another formula can be referred to the Source from *Department of Transportation, Division of new technology & Research Rev. June 1989 State of California.*

Data Analysis

Based on the formula of Gaussian Model versus the Field Measurement on 9, 11, 13 October 2010 at five (5) stations, the data has been analyzed are shown below. The result of three (3) days survey is shown in Figure 3 below.

Station	Average 8 hours CO Concentration (ppm) on 9 Oct 2010				
	No. Vehicles	Emission (lb) per traffic volume	CALINE 4	Field Measurement	Variance ppm
1	51,911	23,207.80	5.5	1.3	4.2
2	39,100	17,144.70	5.4	0.8	4.6
3	30,900	13,548.50	5.3	2.1	3.2
4	24,100	10,528.40	5	4.2	0.8
5	22,395	9,777.50	3.7	4.2	-0.5

Station	Average 8 hours CO Concentration (ppm) on 11 Oct 2010				
	No. Vehicles	Emission (lb) per traffic volume	CALINE 4	Field Measurement	Variance ppm
1	49,494	22,113.32	2.1	0.5	1.5
2	40,200	17,924.80	3.2	0.4	2.8
3	33,900	15,084.40	2.9	2.1	0.8
4	26,800	11,819.80	2.8	2.1	0.7
5	21,369	9,365.31	2.3	0.4	0.9

Station	Average 8 hours CO Concentration (ppm) on 13 Oct 2010				
	No. Vehicles	Emission (lb) per traffic volume	CALINE 4	Field Measurement	Variance ppm
1	40,482	17,884.06	3.3	1.3	2.0
2	43,400	19,330.60	3.3	0.8	2.5
3	35,900	15,913.60	3.0	0.5	2.5
4	27,400	12,044.60	3.1	0.4	2.7
5	21,455	9.335.28	2.0	0.8	1.2

Below data is a variance ppm on the CO concentration background of field measurement early in the morning with lesser of logistics activity compared with the data measure by CELINE4 when the logistic heavily used the road. The variance shows that the CO concentration obviously increased indirectly the marginal damage cost could be higher. The result finding discussed below for further understanding on the marginal social cost of the logistic activity as shown in Figure 5 below.

From the above, the data to be used for measuring the CO concentration and has generate the damage to the environment or social damage cost. Normally the damage cost paid by polluter privately to authority as the marginal cost of abatement and it could be zero if Business as Usual (BAU) activity is lack of abatement. In order to lesser the CO emission it is require to change the mode of services from traditional logistic way to Green Logistics services. BAU without abatement indeed gave an impact to the environment on long term. Below table shows the basic calculation of Fall Fuel and Lubricants of the CO emission rate of vehicles as follows;

Since 1996, IPPC. s Working Group 111 has published a range of carbon cost per tonne range from $5 - $125, in 2000 start from $6 - $160/tC. While in year 1991 – 2000 for the best suggested of the carbon cost. In year 2001 – 2010 the range of carbon cost range of 47 – 154 per tonne of Carbon. Therefore the emission rate above to be used for this study purpose. To establish the external cost of this study will be based on the above emission rate. The result of 3 day survey along 64km road from North Port, Klang to Free commercial Zone, KLIA and the emission (lb) of every station 1,2,3,4 and 5 in Figure 6 below;

Discussion

The data tabulated below configure the damage social cost that incurs from the logistic activity and the amount are very substantial for Social Cost Benefit through the collection of abatement cost as shown below in Figure 6. The social damage cost could be higher because the logistic activity within the residential, industrial and small township area. The Marginal Abatement Damage Cost could be a baseline to ensure that the logistic activity can be monitored and the implementation of Green Logistics is essentially a way to reduce a stock of CO in the atmosphere in the area. Therefore, the damage cost at Station 1, 2, 3, 4 and 5 along the 64km from Northport to KLIA as per above shows that the intensity of logistic activity includes other emission from social activity. The overall damage cost in five (5) stations shows that at Station 1, 2 & 3 incur higher cost where by the Heavy Truck (Diesel) mostly used the road heavily within 45km of this road. The emission becomes lesser towards KLIA due to only a few of Light

Truck and Heavy Truck used the remaining length of the road. Below table tabulated the damage cost within three (3) days survey on the emission from the logistic activity.

STATION	Damage Cost ($)/3 days survey based Best Guess	Estimate Damage Cost ($)/day based Best Guess	Emission per unit traffic volume (lb) /3 day
Station 1	**1,740,617.78**	580,205.95	21,068.39
Station 2	**1,385,048.80**	461,682.93	18,133.23
Station 3	**1,051,039.44**	350,346.48	14,850.32
Station 4	**706,948.44**	235,649.48	11,464.26
Station 5	**555,886.63**	185,295.54	9,772.29
Total	**5,439,541.09**	**1,646,180.38**	163,288.49

Figure 4

From the above data the assume damage cost calculated based on the average of emission traffic volume depends on the location/station and best guess damage cost. Precisely every each station has different emission volumes from the traffic used the road. The assume damage social cost along 64km very much depends on the numbers of logistic vehicles. The approximately damage cost could be assumed as $5,439,541.09 with the CO volume of 163,288.49 (lb)/ emission per unit traffic for three (3) day survey within five (5) stations.

Environmental Fiscal

In establishing the environmental fiscal from the damage cost or external cost discussed above, the government policies on the environment should highlight the importance of social damage cost that should be Social Cost Benefit of the abatement of CO emission form the logistic activity. The cost of abatement as well another issue that government need to highlight to the logistics provider as the idea to embark on the Green Logistic could involve other cost such as the use of green technologies, innovation of delivery mode and packaging, training on driving skill, enhance knowledge on green logistic etc. The importance of policy towards the implementation the Green Logistics to reduce the CO stock in the atmosphere based on the literature reviewed et al C. Richard & D.Kathryn (2002) may not give total impact to the whole environment but at least it could reduce the Social Damage Cost to the society within the area. The complex issue on the damage cost or external cost as the cost generated is the assume cost based on the best guess cost over the decades either it could be lower or higher. Uncertainty of the emission also depends on the initiative to reduce and as well the uncertainty on the damage cost in future. Therefore, to lesser the problems on the uncertainty of damage cost or external cost, the government should established comfortable external cost or taxation (shadow cost of external cost) at very reasonable cost over for few years as part of abatement activity for the sustainability of environment and society.

Logistics Provider Cooperation

As many international brands has embarked on the Green Logistics as discussed and proven on the benefit that reduce the operating cost and CO emission for Social Cost Benefit as an approach of abatement through activity. The innovation on delivery mode, packaging, driving skill, etc has reduced the operating cost of logistics provider regardless of the Social Cost Benefit that another issue of cost incurs from logistic activity. The government should also emphasize on the benefit of Green Logistic to the local logistic provider and impose charges through legislation by stages. While the damage cost or external cost can be imposed through taxation depends to the intensity of logistic activity and depends to their

initiative to reduce CO emission. With that the logistic provider will slowly change the mode of their traditional operandi to more greener by stages with the support of government by providing subsidies, incentive or reduction through taxation. Logistics cooperation to reduce the cumulative CO in the atmosphere helps to reduce damage cost and higher the benefit of the society.

Conclusion

From the discussion, in reforming the environmental fiscal through the external cost or damage cost actually can be realized. The implementation of damage cost through taxation is one of the effective ways of collecting the damage cost from the polluter. This initiative should streamlines with the objective to reform the Social Cost Benefit that driven from the government policy. The government should play an important role to achieve this objective and not just focus on the green technology alone. By doing so the government should also provide the Green Logistics infrastructure to minimize the congestion and fuel usage of the logistic vehicle that currently use a common road with other personal and passenger vehicles.

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LOGISTICS PERFORMANCE MEASUREMENTS: A DESCRIPTIVE ANALYSIS

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Abstract
Logistics give a positive impact for the competitiveness of the country. Thus, the measurement of logistics performance for logistics industry will give a benchmark for industry to enhance industry"s performance towards competitiveness. The purpose of this paper is to examine logistics performance based on update of Abu Bakar, Jaafar, Faisol, & Muhammad (2014) paper and a questionnaire mailed to the logistics and operation managers with 121 respondents from logistics service provider (LSP) companies. The questions consist of eight (8) items of performance measurement in logistics. The finding in this paper provides a benchmark for organisations for assessing the quality of Malaysian logistics performance measurement practices and helps identify opportunities for improvements.

Introduction
An International Journals of Benchmarking has published a number of studies of logistics performance related with various perspectives (Anand & Kodali, 2008; Chan, Chan, Lau, & Ip, 2006; Keebler & Plank, 2009; Rahman, 2011; Shaw, Grant, & Mangan, 2010) including green logistics, reverse logistics, benchmarking models and the benchmarking from the view of LSP. It is increasing in academic topics about benchmark in a recent decades and significant as a practical method for such improvement in areas of business (Anand & Kodali, 2008). The articles that related to body of this research has summarized some significant findings :

1. Components of benchmarking include quality, technology and competitive cost.
2. In terms of performance, quantifiable characteristics such as speed, reliability and price etc. are measured.
3. Benchmarking tools vary and only a few could work with particular service industry

Anand & Kodali (2008) have pointed out very comprehensive views in regard benchmarking. They also concluded definitions of benchmarking as *[…] a continuous analysis of strategies, functions, processes, product or services, performances, etc. compared within or between best-in-class organisations by obtaining information through appropriate data collection method, with the intention of assessing an organisation's current standard and thereby carry out self-improvement by implementing changes to scale or exceed those standards.*

The World Bank has also developed „Logistics Performance Index (LPI) survey, which collects data from 160 countries. This survey is a benchmarking tool to measures performance along the logistics supply chain within a country (Arvis et al., 2014). On the other hand, there are few academic journals and papers focuses on the Malaysian logistics industry (Md Ali, Jaafar, & Mohamad, 2008; Sohail & Sohal, 2003) and performance context. Zuraimi, Mohd Rafi, & Dahlan (2013) focus on logistics development in East Cost region of Malaysia, whereas Ali, Jaafar, & Mohamad (2008) emphasize four difference perspectives to views Malaysian logistics industry. From that study, policy has been regarded as the significant component that influence the competitiveness of the industry. Sohail & Sohal (2003) conducted a survey to determine a usage of third party logistics (3PL) services in Malaysia. They found out by using 3PL, give multiple benefits such as time and cost savings, improved customer services and the benefits of freight payment.

Eventhough the World Bank has released a report regarding the LP, however, to date, most of the studies, and consequent publications, in the area of transport and trade facilitation performance to benchmark were developed by non-academic institutions (Batista, 2012).

Theoretical Definitions
A definition of performance measurement (PM) still remains a broad topic (Neely, Gregory, & Platts, 2005) by reason of differences in objectives and focus of study. Several authors discussed on performance measurement with different structures and details based on their performance functions (Adel El-Baz, 2011; Amaratunga & Baldry, 2003; Banomyong & Supatn, 2011; Beamon, 1998).

Mentzer & Konrad, (1991) defined PM is an analysis of both effectiveness and efficiency in accomplishing a given task. Efficiency is a measure of how economically the firm"s resources are utilized and effectiveness refers to the extent to which customer requirements are met. Langley & Holcomb (1992) extended the definition by adding differences as the ability to create value for the customer through the uniqueness and distinctiveness of logistics services.

In today"s competitive environment, the context of PM becomes broader. Waggoner, Neely, & Kennerley (1999), suggested four elements that force impacting PM system:

1. Internal Influences: power relationships, poor pressure
2. External Influences: legislation, market volatility
3. Process Issues: manner of implementation, innovation saturation
4. Transformational Issues: degree of top-level support, risk of gain/loss from the change.

Review of The Existing Researchs on Measuring Logistics Performance

Abu Bakar et al. (2014) make some conclusion based on an exploratory study that found customs and logistics cost are the main discussed by practitioners in Malaysia. Whereas, the other two components, namely communication and environmentally in logistics also have been highlighted. Ling, Goh, & Desouza (2008) have identified cost ad service capabilities are the top criteria in the selection of the service providers and find out that visibility and pro-activeness are key factors for total customer satisfaction. Andersson, Aronsson, & Storhagen (1989) have identified model for evaluating a company"s overall performance focusing on balancing the conflicting purposes of financial and physical measurement.

On the other side, policy is recommended as priority area to reform an expansion of trade both within South Asia an with the rest of world, thus it is demonstrates the importance of trade facilitation as instrument to expanding the trade activities (Otsuki, Honda, & Wilson, 2013) . Batista, (2012) using Delphi study to developed a framework structure by critical operations performance factors operationalized in terms of trade and transport facilitation. Gupta, Goh, Desouza, & Garg (2011), found some barriers to freer cross-border trade within ASEAN. Unwidely customs procedures and inspections, lack of coordination and arbitrary rulings are some barriers that were highlighted.

The overview of some of existing research shows that, there are important to establish a benchmark with operational and trade facilitation for future development. This paper presents a descriptive analysis from the practitioners of the Malaysian logistics performance and provide a benchmark for improving the current level of performance.

Research Methodology

Based on these findings, the components of Arvis et al., (2014), as well as previous research, a questionnaire was developed. The mailing list came from the membership list of the Federation of Malaysian Freight Forwarders (FMFF) and the Companies Commission of Malaysia (SSM). All data than merge and strictly there are no missing data and redundancy. The final list represented local and international LSP, as well as with asset and non-asset LSP. The final list included a total of 1030 companies. A total of 17 surveys were undeliverable for a net mailing of 1030 surveys, and with 121 returns. The net response from this survey is 12 percent which is almost the same as study by Keebler & Plank (2009) by 11 percent. Most of the list contained potential positions such as executives, managers and directors with experience within two to 20 years in logistics operations.

Next, the research instrument has been analysed using the statistical analysis software to generate frequencies and mean to provide scores for every component. The scores are illustrated in a graph to show the performance provided by the respondents. The results are compared for further analysis and the significant findings in this study than will be concluded for the future research.

From the analysis, it was identified that the Cronbach"s Alpha of this 8 items is 0.71-0.73. According to Gliem & Gliem (2003), they provide the following rule of thumb based on George and Mallery (2003), the Cronbach"s alpha coefficient is greater than 0.70 is considered as good. It is indicated good internal consistency of the items in the scale. This is supported by Nunnaly & Bernstein (2008) that indicated a reliability coefficient of 0.70 and above considered more than acceptable for most behavioral science applications.

Findings and Analysis

Characteristics of respondent

The sample respondents have a broad range of characteristics. From 121 respondents of LSP, 72.7 percent or 88 respondents are an asset based company, whereas the balance of 26.3 percent or 33 respondents are non-asset based. Based on the finding, almost half of the companies (47.9%) were established more than 20 years in Malaysia and 14.9% as second largest respondents had been operating between 5-10 years. Table 1 shows the results the classification of organizations.

Characteristics	Frequency	Percentage
Years of Establishment		
Less than 5 years	15	12.4
Between 5-10 years	18	14.9
Between 10-15 years	13	10.7
Between 15-20 years	16	13.2
More than 20 years	58	47.9
Classification of Asset		
Yes	88	72.7
No	33	26.3
Experience in logistics area		
2-5 years	70	57.9
6-10 years	20	16.5
More than 10 years	31	25.9

Table 1: Profile of organization

Eight key components measuring LP in Malaysia are answered accordingly. It is based on their experience and working arrangements in the logistics industries to assess the LP. It is based on five-scale measurements 1 (lowest) to 5 (highest).

Question 1: Efficiency of customs

Two subsections are according to (a) logistics process and facilities and (b) experience dealing with the customs department.

Efficiency of customs	*Mean*
(a) The efficiency of the following logistics processes and facilities	3.02
(b) Experience dealing with the customs department	3.08

In general, the overall average score (mean) for customs efficiency is 3.04. Thus, it is between average and efficient score. For the efficiency process measures, most of the respondents (more than 50 percent) are not satisfied (inefficient) with import and export clearance process due to lateness in the process of documentation and declaration. Thus, it is affected on time delivery to the consignee. In addition, it is about 28 percent of respondents have an experience with criminal activities such as stolen cargo.

Question 2: Infrastructure

	Mean
Malaysia has a good quality trade and transport related infrastructure	3.33

As expected, the exploratory study (Abu Bakar et al., 2014) showed that Malaysian infrastructure in general have an excellent infrastructure. Based on surveys, respondents agree that we have a good quality related to infrastructure. However, for the specific questions, more than 35 percent of respondents stated that they disagree with the quality of telecommunications infrastructure and IT service. Even though it is a minority of the respondents, but again this will give an effect in the future and the same continuing issues need to be resolved.

Question 3: Logistics Cost

Two subsections are according to (a) Competitive price shipments (Based on transport modes) (b) Operational logistics charges and rates in Malaysia (Based on transport modes)

(a) Competitive price shipments	*(Mean)*
Trucking	3.35
Air Freight	3.54
Sea Freight	3.69
Rail Freight	3.56
Warehousing/Transloading Facilities	3.66
Agent Fees	3.67
(b) Operational logistics charges and rates	*(Mean)*
Trucking	3.02
Air Freight	3.26
Sea Freight	3.36
Rail Freight	3.11
Warehousing/Transloading Facilities	3.01
Agent Fees	3.12

The third question attempted to place logistics performance measurement in the logistics industry in terms of logistics costs. The respondents were given four major transport modes and additional with warehousing and agent fees. The results are interesting. It is not surprising that the logistics cost average showed for a competitive price is 3.58, which is competitive. Based on the overall average score, logistics charges remains 3.15. The lowest logistics charge is sea freight. However, most of the respondents agreed that trucking and warehousing/transloading facility charges are high.

Question 4: Competence and quality of logistics services (Mean)
Three subsections are according to: (a) Competent of logistics operators (b) Transport and logistics industry provides good quality service and (c) Activities and procedures of the following has improved

	Mean
(a) Competent of logistics operators	3.62
(b) Transportation and logistics industry provides good quality service	3.60

(c) The following activities and procedures of the following has improved (Mean)	
Customs clearance procedures	3.61
Other border-related government agencies clearance procedures	3.49
Quality of trade and transport related infrastructure	3.61
Quality of telecommunications/IT infrastructure	3.49
Quality of private logistics services	3.51
Regulation related to logistics	3.60
Solicitation of informal payments in connection with logistics activities	3.44

The fourth question addressed the competence and quality of logistics services in Malaysia. Based on the survey, average scores for subsection (c) is 3.51 and overall score for the fourth question is 3.58. From this point of view, this study concerned about informal payments because of lowest score received. In addition, the telecommunications/IT infrastructure also received lower scores from the surveys and other border-related government agencies clearance procedures as well.

Question 5: Track and trace consignments

It is easy to track and trace consignments	*Mean*
Trucking	3.71
Air freight	3.67
Sea freight	3.58
Rail Freight	3.72

Track and trace consignments is a complement to physical infrastructure. This component plays a key role in a global supply chain to be a competitive advantage in logistics operation and movement. This application also can be an impact in terms of preparation an schedule of manufacturing operations.

The average overall score for this key component is 3.67. Most of the respondents agree that the consignments are easy to track and trace. The results show that the mean score above 3.70 were for trucking and rail freight item – 3.71 and 3.72 respectively.

Question 6: Timeliness

Consignments reach the consignee within the expected time (Mean)	
Trucking	3.53
Air freight	3.39
Sea freight	3.35
Rail Freight	3.35

The sixth question addressed the respondents view of timeliness for logistics performance measurement. Rail and sea freight are shared the lowest score of 3.35. We constructed „Strongly Disagree" to „Strongly Agree" with the center point being labelled neither/nor. Based on overall average, the score for timeliness is 3.37 which is equivalent to "agree" that most of consignments reach the consignee within the expected time.

Question 7: Others		*Mean*
a.	Environmentally friendly Environmental activities in your company with logistics activities	3.60
b.	Communication	3.68

Last but not least, the perception of respondents regarding environmental activities within their company. The specific questions, including set environmental objectives and have planned their operations to take productive action to solve environmental problems. It is not surprising that almost all respondents agree that they set environmental activities in logistics operation. However, according to Abu Bakar et al. (2014), the practitioners claimed their priority is delivering goods on time at the lowest cost possible.

Based on the result of the communication – 3.68 for better and important of communication such as developing information system, improving customer service an utilising mobile solutions are indicated as important for Malaysian logistics industry. These future developments are needed for most of the firm in logistics operations.

Discussion and Conclusions

This research has provided a remarkable contribution in that it has provided a benchmark for the logistics performance measurement in Malaysia. Several conclusions from the research can be done. Most respondents to the survey are not understood about logistics performance measurement and the components itself. Even though the components of LP is a broad topic, but they need to comprehensively measure logistics performance. From the results, we can conclude that the average score of this LP is between 3.00 to 4.00. In addition, several significant items should be noted namely customs that received the lowest score 3.04 as well as timeliness and cost. In addition, further study also needs to figure out on the customs procedure process that has been improved, but the overall score for customs is lower. Figure 1 shows the overall score for the 8 items that were highlighted above.

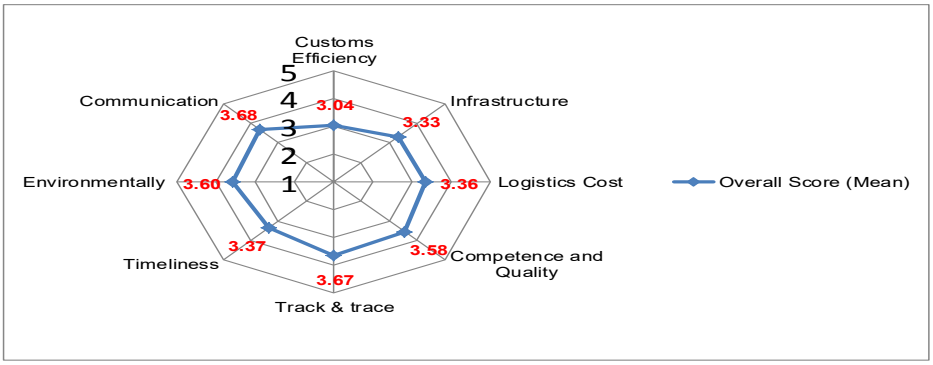

Figure 1: Overall Score (Mean)

For Malaysian logistics industry, it is important to establish a clear relationship between performance and variables. Further research on correlation analysis between performance and variables (cost, infrastructure, cost, competence and quality,track and trace, timeliness,environmentally and communication) in the context of Malaysian logistics will be an interesting result. In addition, comparison in perspective of manufacturers also gives a positive impact in the development of the Malaysian logistics industry.

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Admission Information >>>

Admission Criteria
Admission to the program will be based on the Admission Committee's careful evaluation of the applicant's qualifications.

Master's degree requirement
Applicant must hold a Master's degree in related field.

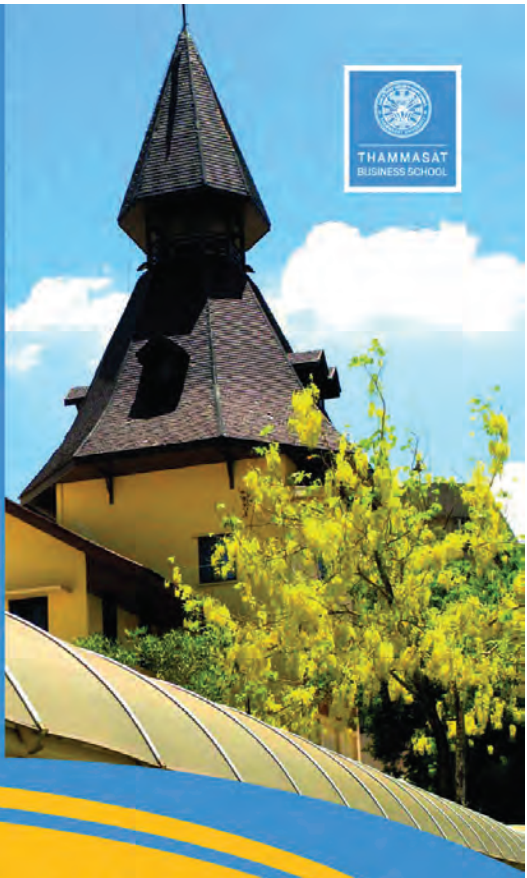
Interview
Applicant must show strong commitment, strong research capability, and ability to communicate in English.

Research Proposal
Only an applicant enrolling for plan I has to submit a research proposal in area of interest and the Ph.D. executive committee will consider and suggest the dissertation advisor who might be interested in the proposal.

Admission Requirements

1) A TU-GET score of 550 or TOEFL score of 550 (paper based), 213 (computer based), 79 (Internet Based) or IELTS score of 6.0 taken within 2 years on the application date.
2) A GMAT score of 550 or GRE score of 1100 (verbal and quantitative parts) or SMART II score of 600 (minimum of 250 for each part) or satisfactory level score of Graduate Program Admission Test taken within 5 years on the application date.
3) Three letters of recommendation
4) A statement of intent to pursue a Ph.D. degree
5) The Research Proposal (for application to Plan I)

Tuition Fees and Expenses
Tuition and general fees are approximately 230,000 Baht per annum.



For more information contact:

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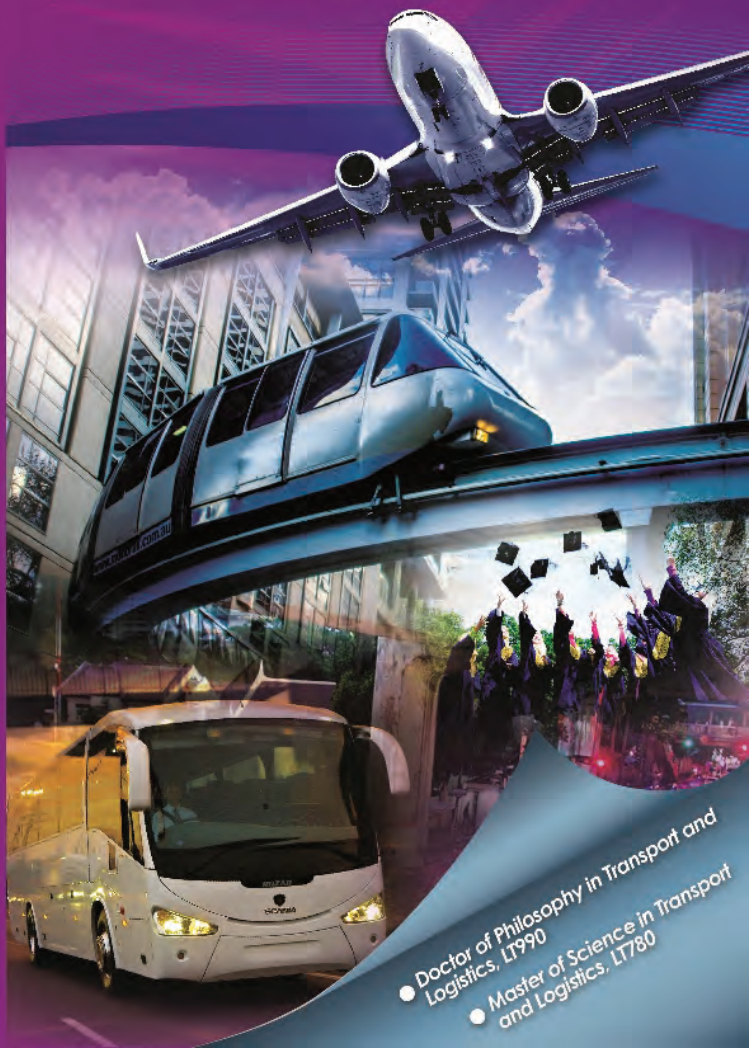

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