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Intelligent commerce: next-generation e-commerce

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DESPITE some high-profile failures, hype has transformed e-commerce into the Holy Grail of the emerging economy. But there are paradoxes and gaps in existing e-commerce models that show that the hype has outpaced any value-based foundation.

Consider the paradox of two basic models of e-commerce: [supply chain](#) management and business-to-business exchanges. E-commerce for supply chain management aims to minimize risk in the flow of materials across the chain -- a steady assured flow. As such, interactions between members of the supply chain and their general behavior are deterministic. Flow of goods is managed and regulated. Over time, the behavior of the supply chain evolves through intervention using proven practices.

On the other hand, business-to-business (B2B) exchanges are managed with uncertainty built in -- there are no guarantees that buyers will buy from specific suppliers within the supply pool. Interactions among buyers and suppliers and their behavior are stochastic. Flow of goods is modeled on free market forces within the players in the exchange. Because of this, the nature of the exchange evolves through natural selection.

The paradox in these two models places the burden on enterprises to ensure that the supply chain is optimized for the entire chain and translates to capacity optimization of chain members. Enterprises must also ensure that their participation in B2B exchanges is profitable.

Second, current e-commerce models have a basic gap in integration. There is a dichotomy and a segregation of financial and non-financial

objective. This is because these three flows, being of three different types, are measured differently. Furthermore, the value of the integration transaction cannot be measured directly and effectively because performance measures for each component are different (because metrics are different). A loan's quality is measured on interest rate, a goods receipt is measured on timeliness and quality, and an advertising campaign is measured on mindshare acquired. There is obviously a need for a common set of transactional measurements or metrics for value integration and a single set of transaction flow metrics and performance measures to assess the overall impact and quality of business decisions.

The second glitch in popular e-commerce models is that these downplay the realities of the performance of internal organizational processes (e.g. within a factory, a plant, or an office). For instance, the supply chain is only as good as the bottleneck step of a factory participating in the chain. A supply network is only as good as the best supplier factory in the network. Factory physics, extended beyond the factory, teaches us this lesson. It is therefore important to account for internal organizational flows in e-commerce models.

All these issues are addressed by a model for e-commerce that is measurable and that drives optimization of e-commerce business flows for high efficiency and effectiveness. This model is intelligent commerce or I-commerce. It is electronic commerce with intelligence. It is the graduation of e-commerce from a purely transactional exercise to an intelligently-managed shaper of business and a generator of new business paradigms.

SEVEN STEPS

Realizing the I-commerce model requires seven key steps. First, all business flows must be modeled into financial equivalents, whether material, service, or financial. Examples: a delivery of finished goods is expressed in its financial equivalent -- the total selling price; management of a promotion by a consultant is represented by his consulting fee. Flows should also be defined with the following information: source enterprise or enterprise unit; destination enterprise or enterprise unit; duration; financial content; flow category (similar to transaction type); start time; end time; and flow type (material, service, or financial). This definition is what we call a control transaction.

Second, control transactions are incorporated into all intra- organizational and cross-organizational processes as a by-product of information systems. Thus, ERP, ERM, CRM, legacy or proprietary, and e-business systems must generate a control transaction for every business transaction that measures the business flow resulting from the business transaction. Initially, this can be done using data warehousing of transaction audit trails and conversion of these trails into control transactions in batch mode. Eventually, control transactions should be

generated in real-time.

Third, common flow metrics and performance measures must be defined. The critical I-commerce indicators are:

- Flow rate, $FR = \text{amount/duration}$
- Flow efficiency = $FR, \text{out} / FR, \text{in}$
- Flow effectiveness = $\text{change in average } FR / \text{duration}$
- $FR = \text{material flow rate} + \text{service flow rate} + \text{financial flow rate}$

Fourth, intelligent commerce or I-commerce gates -- information collection systems -- are established to measure business flows and flow performance across designated boundaries inside organizations and between organizations, organization chains, and exchanges using control transactions. I-commerce gates use control transactions to peek into the velocity, size, efficiency, and trends of business flows inside and among enterprises.

Fifth, I-commerce performance measurement applications must be implemented using information from I-commerce gates. Performance measurement applications are used to monitor e-commerce and regular commerce business flows so that these can be managed in terms of size, velocity, and quality for increasing their value to business owners.

Sixth, e-commerce and traditional commerce network linkages need to be restructured or remodeled to improve flow rates and efficiency.

Seventh and last, I-commerce indicators need to be remeasured periodically and dynamically.

IMPACT ON BUSINESS

How will the I-commerce model impact the business environment? The I-commerce model will cause the internal uncoupling or disaggregation of traditional businesses and enterprises and their recombination into new business models. I-commerce will cause the radical redefinition of business models. The models that will survive or emerge are:

- Horizontal businesses -- organizations that manage flow rates end-to-end tightly for a specific business function for other client organizations, owned by external parties, exemplified by: marketing organizations; financial organizations; purchasing organizations; production organizations; distribution/logistic organizations; and human resource organizations.
- Supply chain businesses -- organizations that manage flow rates end-

to-end tightly for purchasing, production floor materials management, and distribution for several client organizations.

- Service deployment businesses -- organizations that manage flow rates end-to-end tightly for human services for several client organizations. These would be like brokers of various human services.
- Diagonal businesses -- organizations that manage flow rates end-to-end tightly for all business functions for a client organization using distinct horizontal, supply chain, and service deployment businesses. For example, a diagonal business could use a Chinese purchasing organization, a Japanese production plant, an American distribution company, and a British financial organization as components to meet a client's objective.
- Material exchange businesses -- organizations that pull and push material flows among client organizations: traditional B2B exchanges.
- Financial exchange businesses -- organizations that pull and push financial flows among client organizations: banks, financial trading organizations, etc.
- Service exchange businesses -- organizations that pull and push service flows among client organizations. This is would be analogous to barter trading in services. As an example, investment planning services could be traded for customer services.
- Transformation exchange businesses -- organizations that pull one type of flow (financial, material, or service) from one client organization and push to this same client organization a different type of flow from another client organization in exchange. For example, a client could offer raw semiconductor materials to this type of exchange and get an offer of marketing services (financially equivalent) in return from the exchange.
- Intelligent commerce businesses -- organizations that manage information on flow rates for horizontal, supply chain, service deployment, diagonal, and exchange businesses for a client(s). As strategic information, executive information, and decision support systems are to transactional systems in traditional IT architectures, the I-commerce systems of these businesses are to the transactional e-commerce systems of their clients.

The key technologies to I-commerce will be intelligent software agents, constraint propagation systems, rule-based (e.g. expert systems) systems, genetic algorithm systems, neural networks, and systems used in operations research (e.g. heuristics, linear programming, etc.). These technologies will enable automated data search, collection, and matching; real-time optimization of business flow modeling; progressive robustness of business models; intelligent business flow controls; and dynamic

relearning whenever business configurations and organization linkages and networks change.

I-commerce is the maturing of e-commerce. E-commerce minus intelligence is a high-tech, trial-and-error, high-risk rendezvous. I-commerce introduces responsibility and accountability to e-commerce through performance and quality measures. As e-commerce metamorphoses into I-commerce, the value to business is increased dramatically as it becomes predictable and sustainable.

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