SALIENT® MANAGEMENT COMPANY

Overall Supply Chain Effectiveness Concept

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Overall Supply Chain Effectiveness

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Overview

Businesses have transformed from centralized, vertically integrated entities, into virtual organizations that reach globally through a network of supply – in order to service a global customer base. Traditional forms of communication through policy and direct contact have necessarily morphed to a complex digital network. Key attributes of visibility and metrics are essential for determining performance success. The businesses that are able to achieve high performance in navigating the complexities, while driving towards the respective business objectives, find that this network of supply, known as the supply chain, is a strategic advantage. **And, there will be an intense desire to continuously increase the productivity and effectiveness of that supply chain.**

The supply chain is distinguished from Sales, Engineering, Finance, and possibly Production, etc. Typically, supply chain will include suppliers (from raw to finished goods), procurement, order management, planning, scheduling, shipping, distribution, and freight processes. It is fueled by working capital including inventory (measured as Days of Supply (DOS)), accounts receivables (Days Sales Outstanding (DSO)), accounts payables (Days Payables Outstanding (DPO)), and cash, and is a continuum from original source through customer receipt and payment. Depending on the definition, some companies will contend that 70-90% of revenue is consumed by supply chain costs. In those cases, they include the "material" purchases (and their associated value add) within those costs (part of COGS). On the other end of the spectrum, some will say it is more like 5-10% of revenue, and they are primarily talking the processing costs and possibly the transportation/freight costs.

There is an opportunity within the supply chain to investigate underperformance to the productivity improvement targets, as well as understand the value of the individual's actions. Key areas of focus are quality and responsiveness to the customer, productivity and profitability, and cash flow efficiency. While metrics such as Gross Margin Return on Inventory Investment (GMROII), Inventory Turns, Supply Chain Costs/Revenue, etc. are important, an extremely effective approach to continuous improvement is through a comprehensive metric that aligns the business goals to individual actions. Such comprehensive metrics are comprised of compounded sub metrics that can be investigated individually to root cause of underperformance. For Supply Chain, we have developed a conceptual framework for Overall Supply Chain Effectiveness (OSCE).

Overall Supply Chain Effectiveness (OSCE)

OSCE is a comprehensive metric that captures the essence of supplying right value at the right time to each customer, while driving improved productivity and profitability, and optimizing capital. The premise is "if we improve on the effectiveness of order flow, and on the use of capital to generate cash, the result will be increased customer satisfaction and bottom line results".

OSCE looks at Perfect Order (PO), Cash-To-Cash (C2C, also called Cash Conversion Cycle), and Supply Chain Cost/Revenue (SCC/Revenue). Since the supply chain can be extensive, and include many suppliers, transportation modes, etc., OSCE needs to summarize across the scope of that network. Conversely, if it only captures a portion of the supply chain, you may be underperforming in areas outside of the metric span, thus sub-optimizing.

First – what about other metrics?

While **Gross Margin Return on Inventory Invested (GMROII)** is an excellent metric that balances the gross margin and cost of inventory at all points in the supply chain with availability to the customer, it is somewhat misaligned to supply chain interests:

- **Gross Margin** is dependent on mix, pricing, design, direct labor and direct burden – in addition to direct material costs and associated procurement costs. Much of this is outside of the "supply chain" control.

- **Inventory investment** is a very good metric if presented as Inventory Turns, where the COGS throughput is the numerator. Otherwise, if it is only used as the absolute $ investment, it disregards the changing business model. Also, a nuance of inventory is that a business unit may have a very high margin and high volume product with relatively little inventory invested, while another business unit may have a high mix, low margin, small batch complex product that requires very high inventory for the same revenue and level of service. Thus, even within your own company, your GMROII could vary dramatically as you change your mix and product portfolio, let alone attempting to compare across companies!

Many of the other suggested metrics are actually sub-metrics that are covered within the proposed OSCE metric. Also, for capital intensive supply chains, in which a company has significant investment in fixed assets such as fleets, equipment, buildings, etc, there may be interest in adding a metric that covers asset effectiveness or asset utilization. We suggest that an asset type metric could be a fourth factor for OSCE.

PO, C2C, and SCC/Revenue

So, why PO, C2C, and SCC/Revenue?

"Doesn't it have some of the same issues as other metrics (e.g. not totally within control of the supply chain; could be affected by the business model….)?" As we review the sub metrics, first, **PO** is mostly within control of supply chain. The sub metrics of Inventory Accuracy, Warehouse Pick Accuracy, and On Time Shipment are responsibilities of functions within the scope of supply chain, even though Order Entry and Invoice Accuracy are responsibilities of customer service and finance respectively.

C2C is affected dramatically by managing inventory (Days of Supply (DSO)), which is within the supply chain control (procurement, planning, inventory management). It has a big impact on ability to shrink the supply chain cycle time (e.g. using Lean principles to reduce inventory through reduced waste, reduced cycle times, etc.) for providing products to the customer, as well as reducing costs, resulting in increased competitiveness and leverage to encourage faster payment (Accounts Receivables, Days Sales Outstanding (DSO)). Also, the supply chain process is instrumental in managing payables (Accounts Payables, Days Payables Outstanding (DPO)) for best results (e.g. discounts, terms, etc.).

SCC/Revenue is impacted directly by the supply chain costs which are affected by the processes and actions of the respective supply chain functions, subject to the business framework of volume, location of customer, mix, design, sourcing constraints, etc. And, although revenue is more directly impacted by functions outside of supply chain such as pricing, design, sales, and marketing, it is indirectly affected by the supply chain, where performance impacts competitiveness and customer retention.

Calculating OSCE

The calculations of OSCE are as follows:

Perfect Order % (PO%) = Order Entry Accuracy * Inventory Accuracy * Warehouse Pick Accuracy * On Time * Invoice Accuracy; and are each % that are compounded into a %; Did I process the order to expectations?

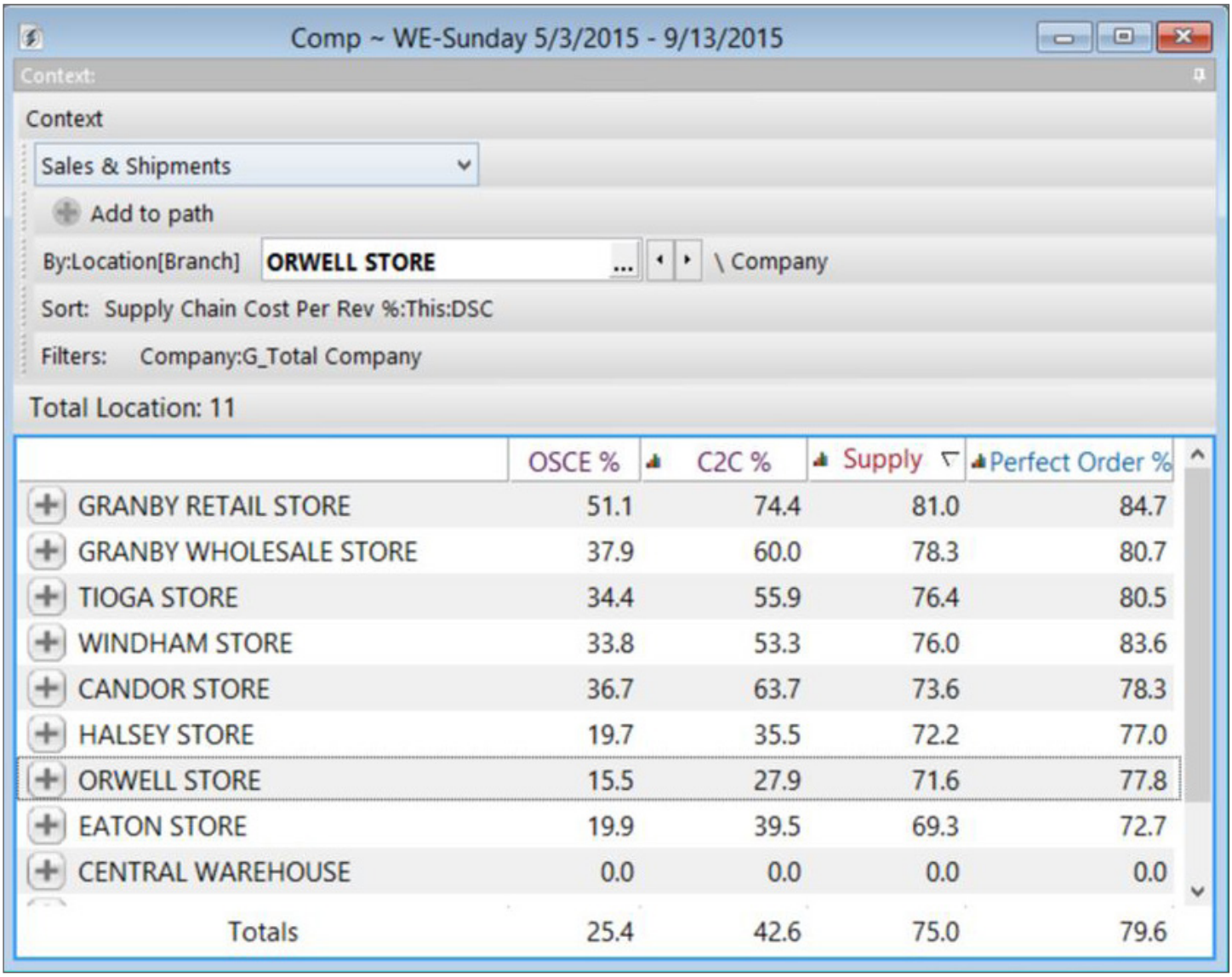
Cash-To-Cash % (C2C%) = Target C2C/ Actual C2C, where C2C equals Days Sales Outstanding + Days of Supply - Days Payables Outstanding (DSO+DOS-DPO) in Days; Did I optimize the velocity of materials and cash?

Supply Chain Costs/Revenue % (SCC/R%) = Target %/ Actual%; Did I optimize the costs?

Hypothetical example:

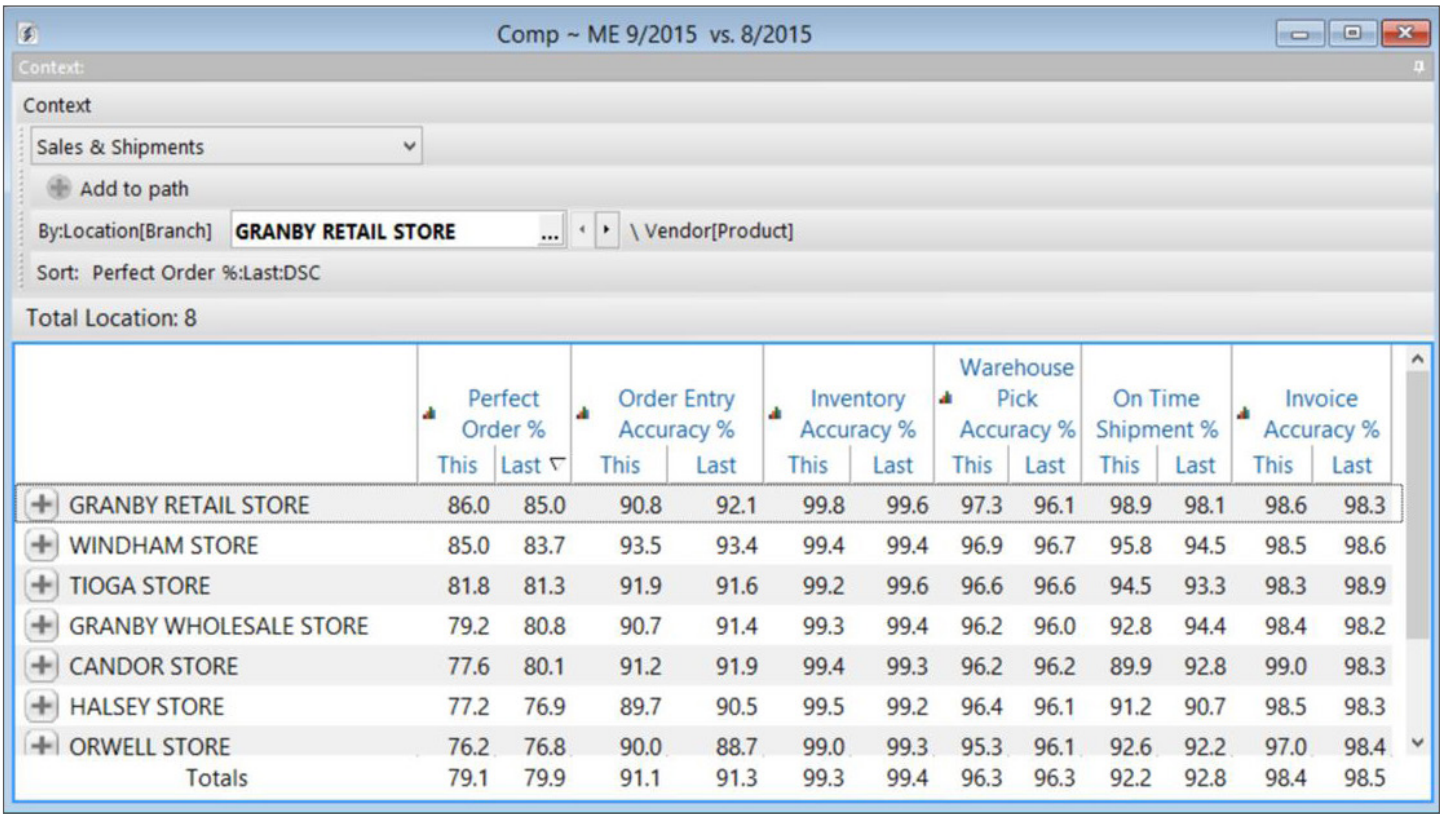
- PO% – 85% * 99.7%*99%*80%*97% = 65.1%
- C2C% – 40+60-50 = 50 Days; Target = 40 Days, thus 40/50 = 80%
- SCCR% = 10%; Target 8%, thus 8/10 = 80%
- OSCE = 65.1 * .80 *.80 = 41.7%

The following screen shots are representative of Salient's approach to the Data Visual Mining and Performance Management…..



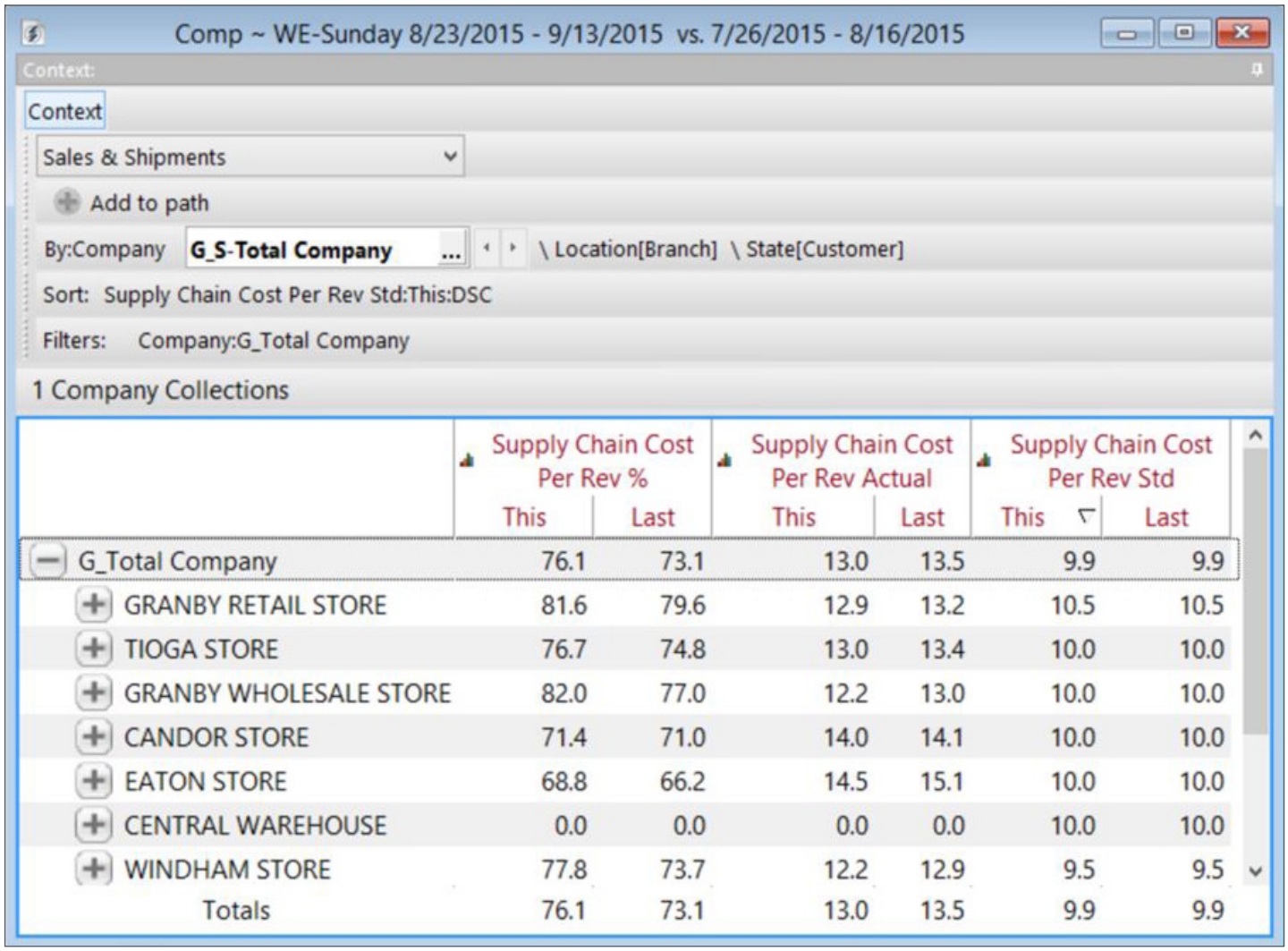
	OSCE %	C2C %	Supply	Perfect Order %
GRANBY RETAIL STORE	51.1	74.4	81.0	84.7
GRANBY WHOLESALE STORE	37.9	60.0	78.3	80.7
TIOGA STORE	34.4	55.9	76.4	80.5
WINDHAM STORE	33.8	53.3	76.0	83.6
CANDOR STORE	36.7	63.7	73.6	78.3
HALSEY STORE	19.7	35.5	72.2	77.0
ORWELL STORE	15.5	27.9	71.6	77.8
EATON STORE	19.9	39.5	69.3	72.7
CENTRAL WAREHOUSE	0.0	0.0	0.0	0.0
Totals	25.4	42.6	75.0	79.6

Figure 1– OSCE Summary by Branch



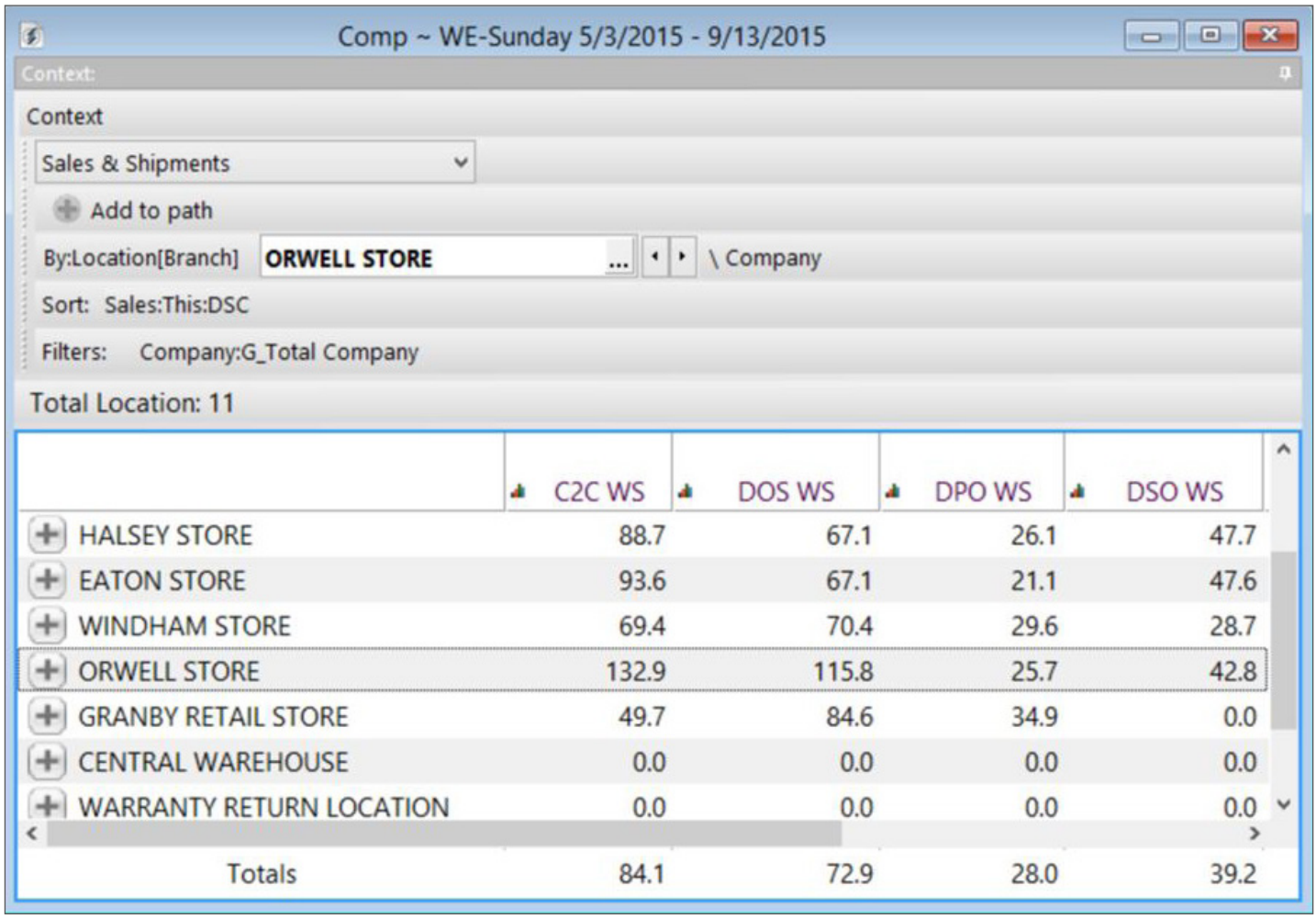
	Perfect Order %		Order Entry Accuracy %		Inventory Accuracy %		Warehouse Pick Accuracy %		On Time Shipment %		Invoice Accuracy %	
	This	Last	This	Last	This	Last	This	Last	This	Last	This	Last
GRANBY RETAIL STORE	86.0	85.0	90.8	92.1	99.8	99.6	97.3	96.1	98.9	98.1	98.6	98.3
WINDHAM STORE	85.0	83.7	93.5	93.4	99.4	99.4	96.9	96.7	95.8	94.5	98.5	98.6
TIOGA STORE	81.8	81.3	91.9	91.6	99.2	99.6	96.6	96.6	94.5	93.3	98.3	98.9
GRANBY WHOLESALE STORE	79.2	80.8	90.7	91.4	99.3	99.4	96.2	96.0	92.8	94.4	98.4	98.2
CANDOR STORE	77.6	80.1	91.2	91.9	99.4	99.3	96.2	96.2	89.9	92.8	99.0	98.3
HALSEY STORE	77.2	76.9	89.7	90.5	99.5	99.2	96.4	96.1	91.2	90.7	98.5	98.3
ORWELL STORE	76.2	76.8	90.0	88.7	99.0	99.3	95.3	96.1	92.6	92.2	97.0	98.4
Totals	79.1	79.9	91.1	91.3	99.3	99.4	96.3	96.3	92.2	92.8	98.4	98.5

Figure 2 – Perfect Order



	Supply Chain Cost Per Rev %		Supply Chain Cost Per Rev Actual		Supply Chain Cost Per Rev Std	
	This	Last	This	Last	This	Last
G_Total Company	76.1	73.1	13.0	13.5	9.9	9.9
GRANBY RETAIL STORE	81.6	79.6	12.9	13.2	10.5	10.5
TIOGA STORE	76.7	74.8	13.0	13.4	10.0	10.0
GRANBY WHOLESALE STORE	82.0	77.0	12.2	13.0	10.0	10.0
CANDOR STORE	71.4	71.0	14.0	14.1	10.0	10.0
EATON STORE	68.8	66.2	14.5	15.1	10.0	10.0
CENTRAL WAREHOUSE	0.0	0.0	0.0	0.0	10.0	10.0
WINDHAM STORE	77.8	73.7	12.2	12.9	9.5	9.5
Totals	76.1	73.1	13.0	13.5	9.9	9.9

Figure 4 – Supply Chain Costs/Revenue



	C2C WS	DOS WS	DPO WS	DSO WS
HALSEY STORE	88.7	67.1	26.1	47.7
EATON STORE	93.6	67.1	21.1	47.6
WINDHAM STORE	69.4	70.4	29.6	28.7
ORWELL STORE	132.9	115.8	25.7	42.8
GRANBY RETAIL STORE	49.7	84.6	34.9	0.0
CENTRAL WAREHOUSE	0.0	0.0	0.0	0.0
WARRANTY RETURN LOCATION	0.0	0.0	0.0	0.0
Totals	84.1	72.9	28.0	39.2

Figure 3 – Cash To Cash

Value of Perfect Order

The Supply Chain Council defines perfect order fulfillment measurement as the percentage of orders delivered to the right place, with the right product, at the right time, in the right condition, in the right package, in the right quantity, with the right documentation, to the right customer, with the correct invoice. Failure to meet any of these conditions results in a less than perfect order. While the sub metrics within PO may vary from business to business, companies that boast some of the highest perfect order rates tend to carry less inventory, experience shorter C2C cycle times, and have significantly fewer stock-outs than their competitors.

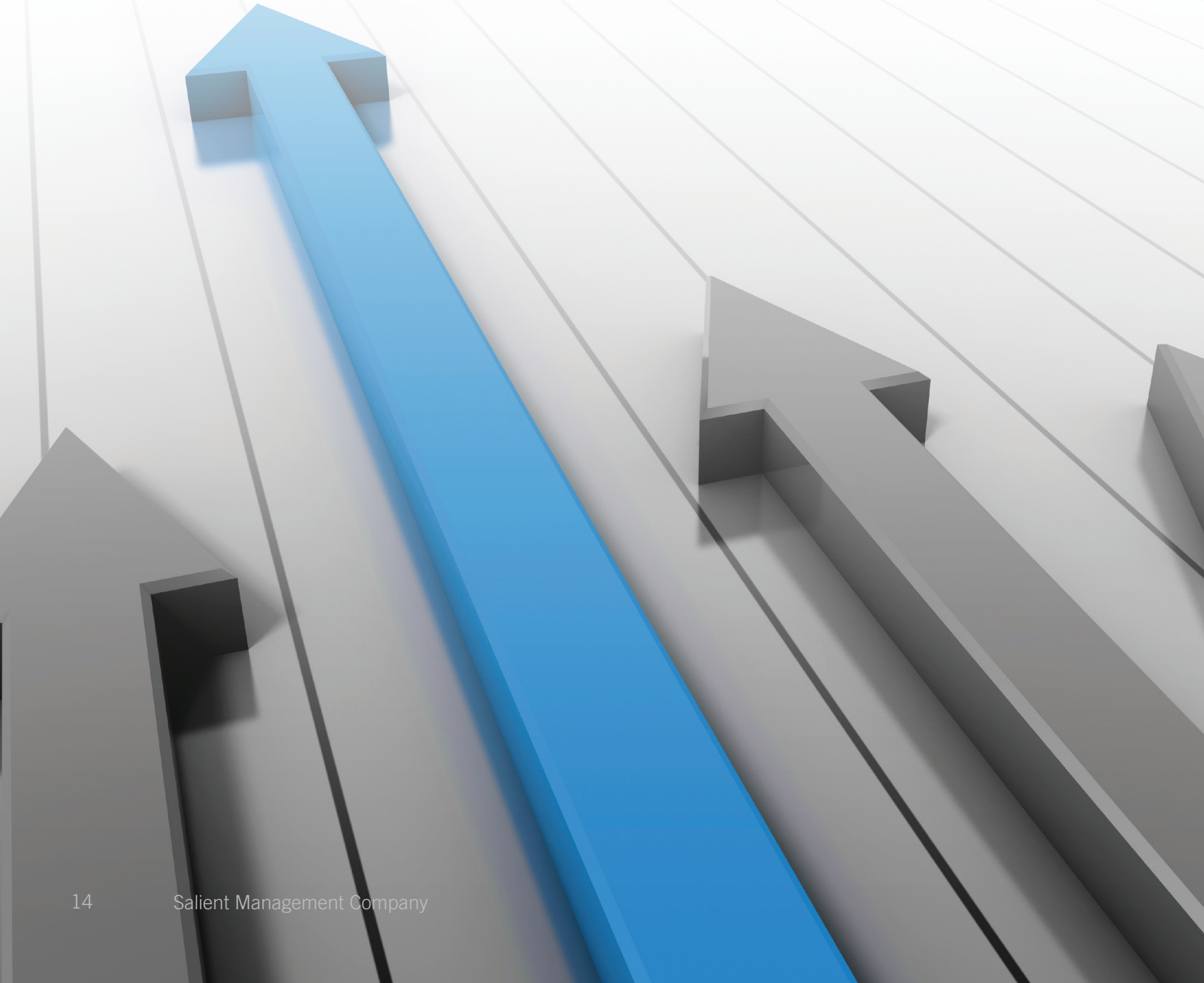
The term PO came out of the grocery industry many years ago, and while generally recognized by most supply chain professionals, it can mean different things to different companies and supply chains. There are some caveats:

- There is dramatic erosion from 100% due to compounding (e.g. .9*.9*.9*.9*.9.....)
- Companies use varying definitions. For example, some use whether the order was shipped on-time rather than delivered on-time in their calculations. The best approach is to measure trends within the same context, definition – typically within a company.
- There is a cost to be perfect, and a law of diminishing returns at some level where you actually start to reduce profit. Where do you draw the line?
- Documentation can mean many things, including invoices, shipping manifests, bar code labeling, carton contents labeling, advanced ship notices, and even now RFID tagging, etc. Of course, customer requirements for these and other "documents" vary dramatically between industries and individual customers.

The improvement of the PO sub metrics require varying investments, and result in different levels of business impact, thus you need to understand each in context of your business, and determine where to put your resources!

So What? – PO is the first insight and influence into customer satisfaction – did they get what they wanted, when they wanted – without hassle! The value of improving on the PO measure are shorter cycles which result in reduced inventory, reduced cost of capital, reduced waste (scrap, rejects, returns, expediting), improved customer service and retention.

Value of Cash-To-Cash



Value can be achieved through improving the C2C metric with improved processes that are more efficient and effective. While it doesn't directly measure profit results, C2C does impact the bottom line considering the time-value of money and inventory carrying costs. Also, there may be additional bottom line impact if you consider the terms, such as getting discounts for faster payment (Accounts Payables), and giving discounts for faster payment (Accounts Receivables). And, most importantly, the process improvement in order to improve C2C will also impact profitability, asset utilization, and competitiveness.

C2C expresses the length of time (in days) that it takes for a company to convert resource inputs into cash flows. The cash conversion cycle attempts to measure the amount of time each net input dollar is tied up in the production and sales process before it is converted into cash through sales and collection from customers. This metric looks at the turnover time of inventory, the amount of time needed to collect receivables, and the length of time the company is afforded to pay its bills without incurring penalties.

The calculation is Days Sales Outstanding (DSO) + Days of Supply (DOS) - Days Payables Outstanding (DPO):

- DSO = Accounts Receivables/(Sales/365), and this could be current AR or average over time, and the 365 could be adjusted to # business days
- DOS = Inventory/(COGS/365), and this could be current Inventory or average over time, and the 365 could be adjusted to # business days. It is possible that some industries may prefer to use Sales rather than COGS.
- DPO = Accounts Payables/(COGS/365)*, and this could be current AP or average over time, and the 365 could be adjusted to # business days.

*Caution! – While a larger DPO will help the overall C2C calculation - it somewhat defies logic. All you would be doing is delaying payment to the suppliers, which penalizes them and would be probably reflected in future pricing!!

So What? – C2C is not just an efficiency of money measure, in which improvement impacts the time-value of money. Focusing on the speed of payments can also help suppliers, the company, and customers achieve lower costs. The value of improving on C2C is reduced inventory investment and carrying costs, improved collection on accounts receivables (time value of money, reduced uncollectable), and improved terms with suppliers. But even greater value is realized through improved competitiveness, reduced waste, optimized capacities, etc. A focus on C2C affects much more than meets the eye! With all else equal, why not!?

Value of Supply Chain Costs/Revenue

The PO and C2C metrics will drive performance improvement, with a resultant impact to the Profit and Loss Statement and Balance Sheet. SCC/R provides an additional metric that includes all supply chain costs not covered by PO and C2C, including material costs, procurement costs, freight costs, returns, etc.

In cases where the PO and/or C2C seem to be improving, but the overall SCC/R is not decreasing, you may investigate the underlying root causes. For example, material costs (if part of supply chain costs) may be affected by poor negotiations, inflation, expediting, etc.; Procurement efforts may be increasing while trying to improve on the PO and/or C2C, or be impacted by product proliferation, etc. Similarly, freight costs (if part of supply chain costs) may be growing due to mode selection, carrier negotiation, source and destination changes, expediting, etc. And returns, while having provided the perfect order, could be a result of customer changes, etc.

So What? – Supply Chain Costs/Revenue captures an overall measure of supply chain costs relative to the business growth or shrinkage, and supplements the more specific PO and C2C measures. The value of improving SCC/R is further reduction of operating costs and improved Net Operating Profit, plus improved Asset Utilization (working capital, fixed assets).

Performance Accounting and Decision Support

The improvement of OSCE is enabled through investments in software/technology, process improvement, and organizational development. In addition, methods such as Performance Accounting and Decision Support provide further benefits through more rapid realization of OSCE improvement, institutionalization of best practices, and through discovery of business opportunities (not possible in more static analyses or reports) (Figure 1).

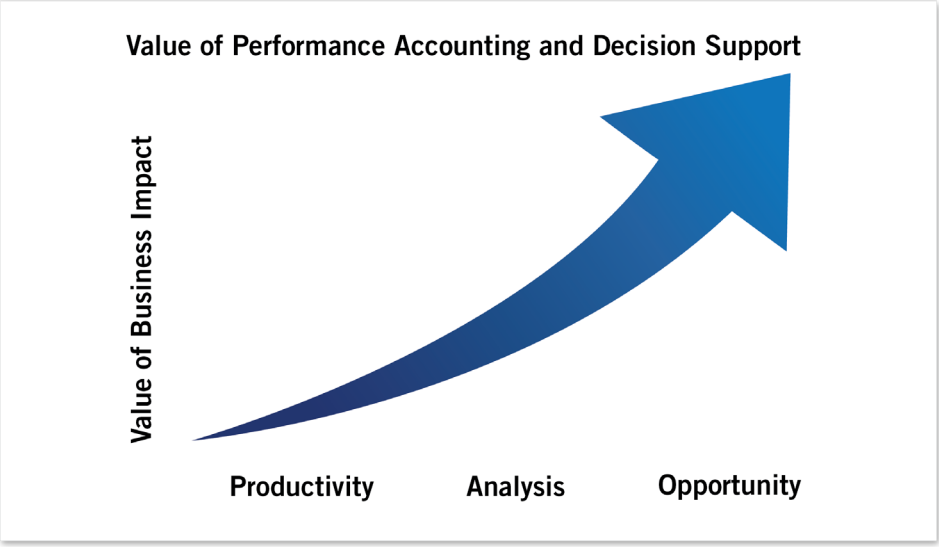


Figure 1

Productivity = automation of reports, metrics—replacing Excel reports, system customization

Analysis = use of Performance Accounting and Decision Support to investigate patterns of data, root cause of underperformance

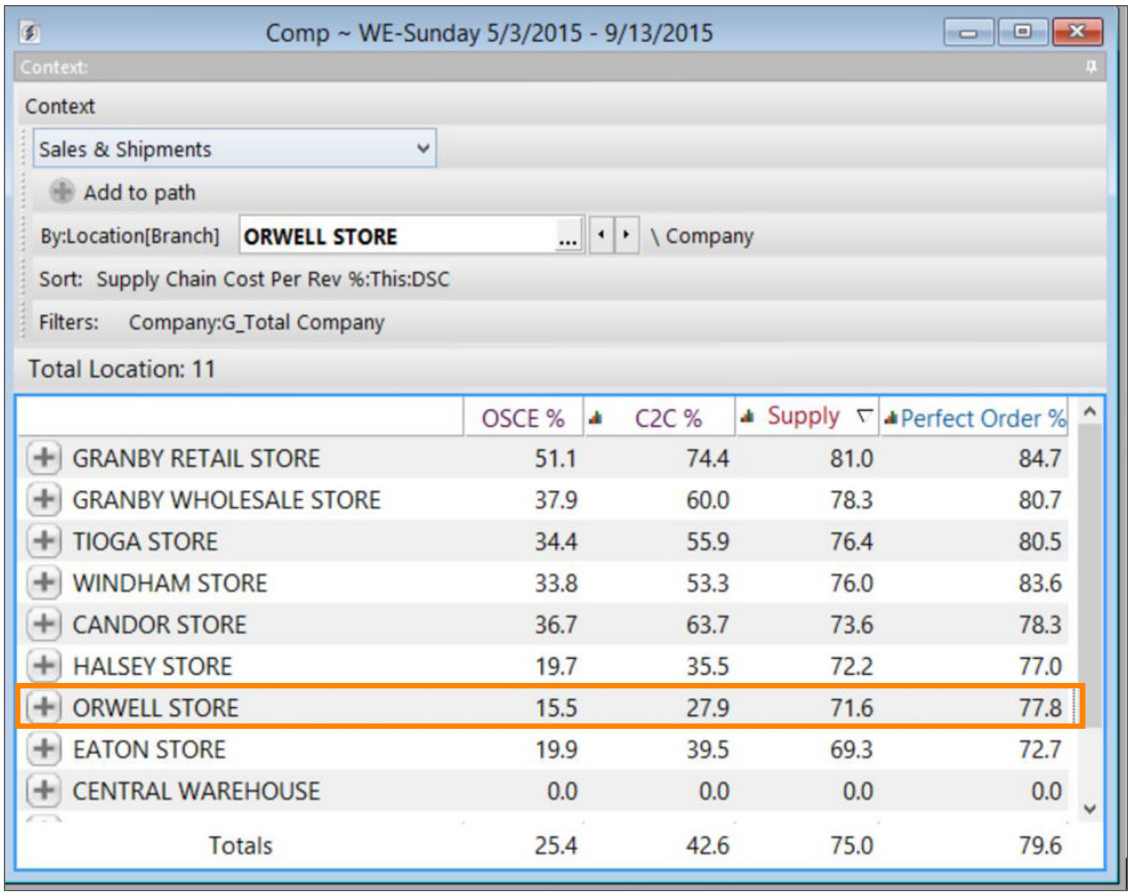
Opportunity = frequent identification of new business opportunities which results in top-line impact, such as promotions, sales analysis, supply/demand

Salient Management provides automation of multiple data sources consolidation, aggregation, presentation, and synthesis. The technology enables timely analysis of business results in order to recognize patterns of behavior, and to project future results based on motivating factors (metrics). It is an enhancement over traditional reporting such as Excel reports, ERP customization, etc. as it automates the data gathering and formatting, thus providing productivity improvements. Additionally, Salient Management can provide benefits through timely exception-based investigation of data patterns and root cause of underperformance, which enhances the analyses capabilities. And, a very high level of benefit can be realized in situations that new opportunities are afforded, such as insights on promotions, sales performance, new business ventures, supply and demand consolidations, inventory optimization, SKU rationalization, etc. All of these improved practices are institutionalized through building the practice around each role of the company. This affords sustained continuous improvement – rather than ad-hoc findings.

In our Value of Improving OSCE analysis, the additional benefits realized through the use of Salient Management (beyond more traditional approaches to improving OSCE) can be top-line revenue of an additional 1 to 3%, and/or additional 1 to 2 Points of Gross Margin, and an additional 1 to 2 Points of Net Operating Profit. These benefits are due to faster reduction of the gap from Current to To-Be (more months of the benefits), and greater reduction through increased capabilities (Productivity, Analysis, Opportunities).

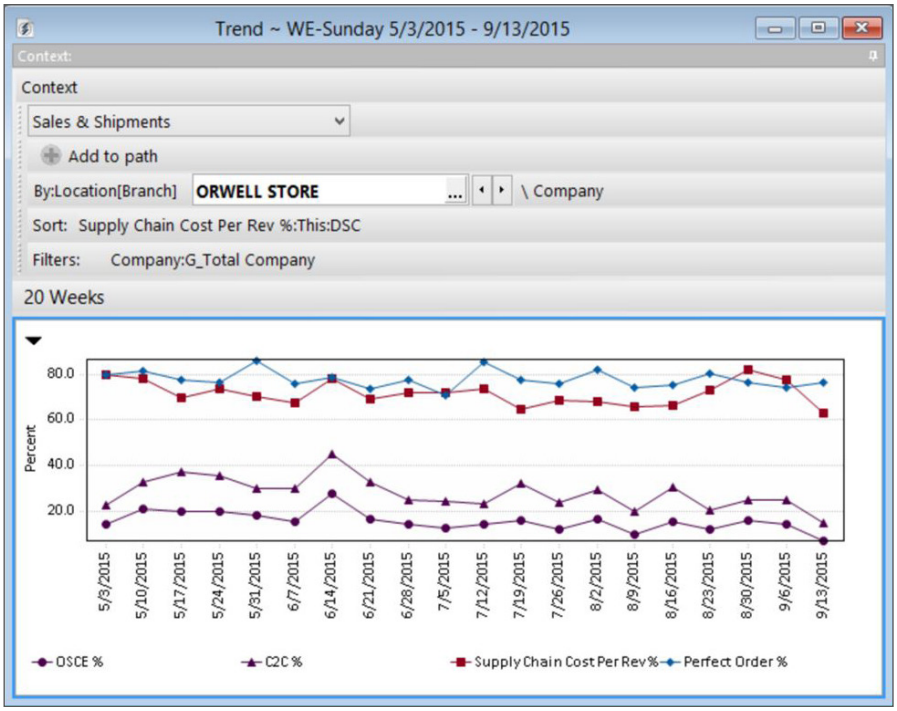
Example Scenario

The Orwell Branch continues to have unsatisfactory OSCE performance, especially concerning Cash To Cash.

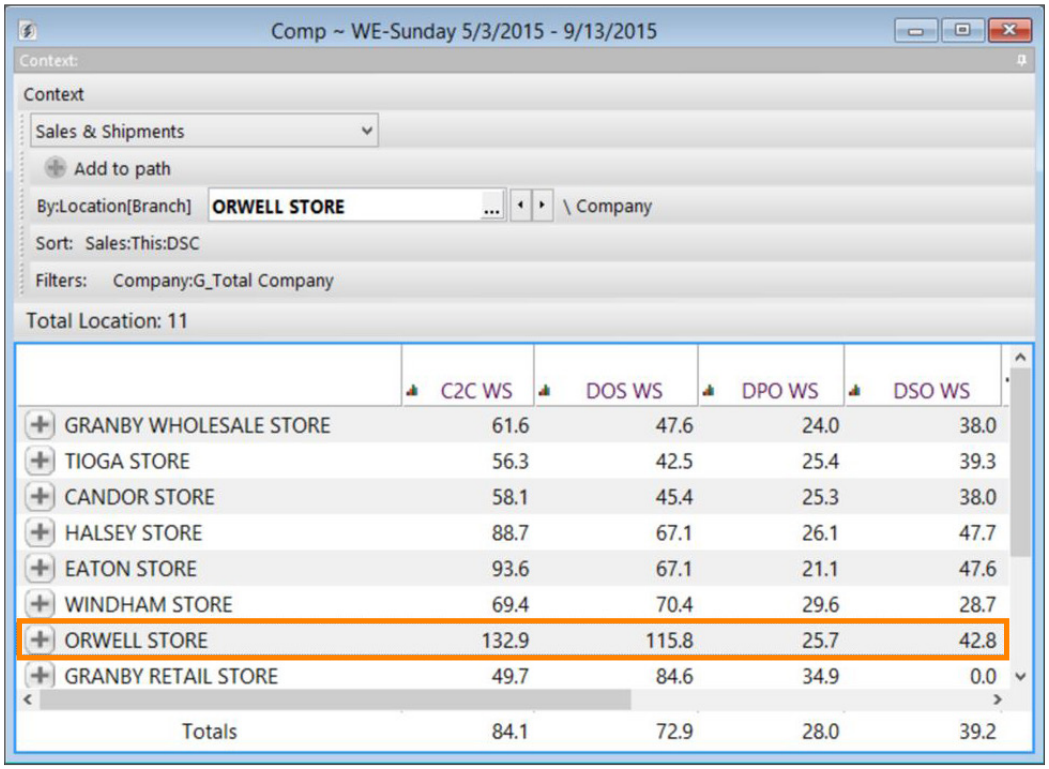


	OSCE %	C2C %	Supply	Perfect Order %
GRANBY RETAIL STORE	51.1	74.4	81.0	84.7
GRANBY WHOLESALE STORE	37.9	60.0	78.3	80.7
TIOGA STORE	34.4	55.9	76.4	80.5
WINDHAM STORE	33.8	53.3	76.0	83.6
CANDOR STORE	36.7	63.7	73.6	78.3
HALSEY STORE	19.7	35.5	72.2	77.0
ORWELL STORE	15.5	27.9	71.6	77.8
EATON STORE	19.9	39.5	69.3	72.7
CENTRAL WAREHOUSE	0.0	0.0	0.0	0.0
Totals	25.4	42.6	75.0	79.6

It is clear that the Cash To Cash has trended downward, so time to investigate.

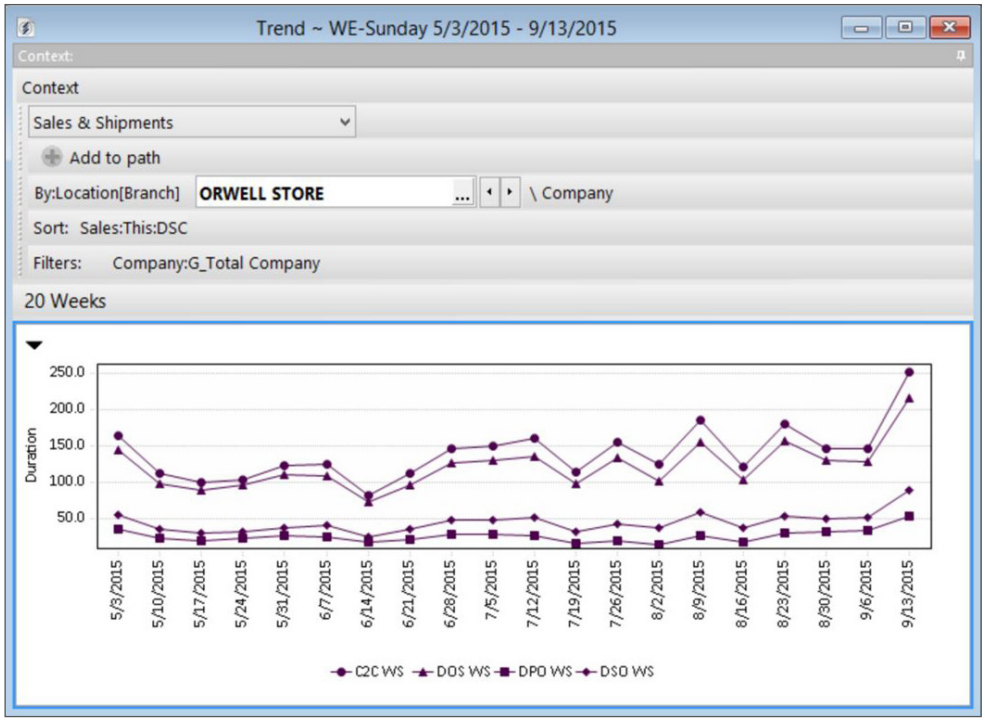


The challenge appears to be a very high Days of Supply (Inventory), which is distorting the overall Cash To Cash metric.

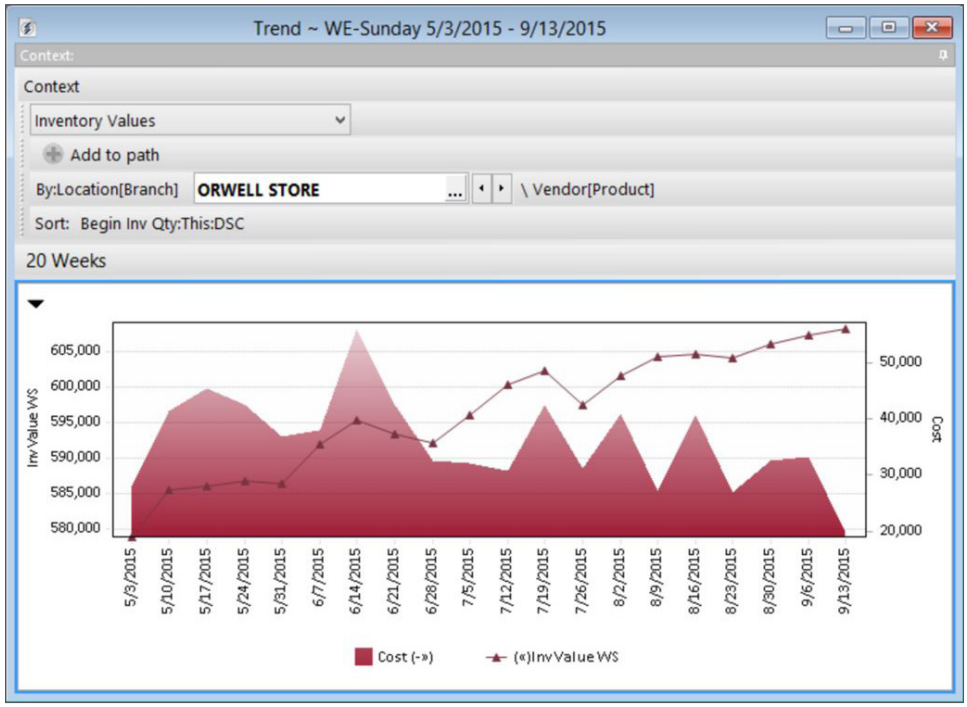


	C2C WS	DOS WS	DPO WS	DSO WS
GRANBY WHOLESALE STORE	61.6	47.6	24.0	38.0
TIOGA STORE	56.3	42.5	25.4	39.3
CANDOR STORE	58.1	45.4	25.3	38.0
HALSEY STORE	88.7	67.1	26.1	47.7
EATON STORE	93.6	67.1	21.1	47.6
WINDHAM STORE	69.4	70.4	29.6	28.7
ORWELL STORE	132.9	115.8	25.7	42.8
GRANBY RETAIL STORE	49.7	84.6	34.9	0.0
Totals	84.1	72.9	28.0	39.2

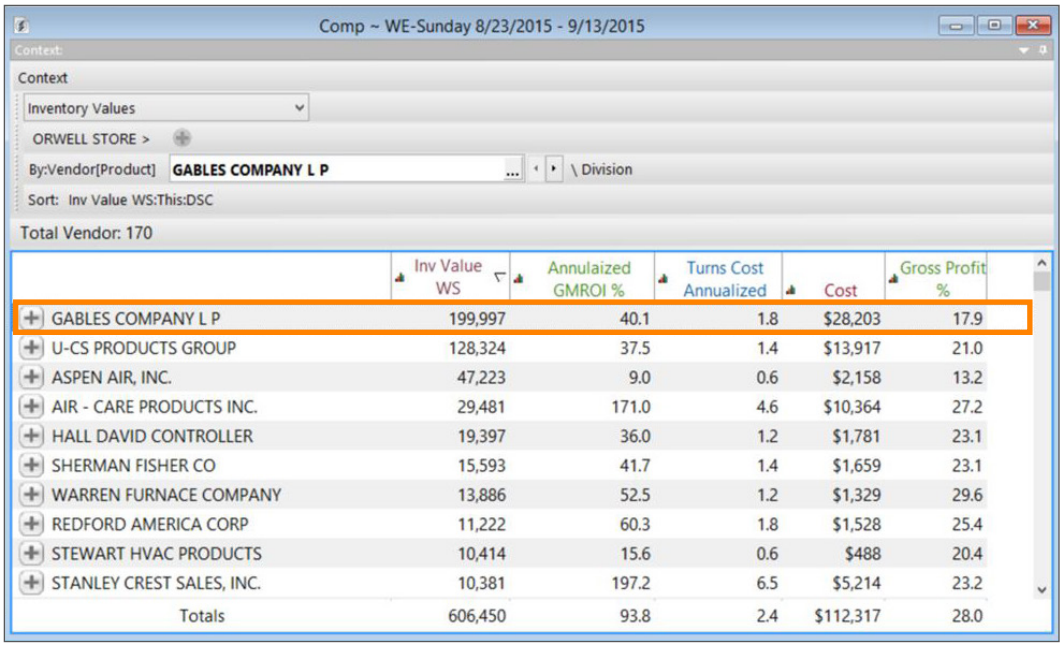
It is also apparent that there has been a recent spike in levels of inventory.



As inventory is spiking, the Cost of Goods (thus Revenue) is declining. It is time to adjust ordering policies on incoming products to stock. Further investigation into the specific products is warranted.

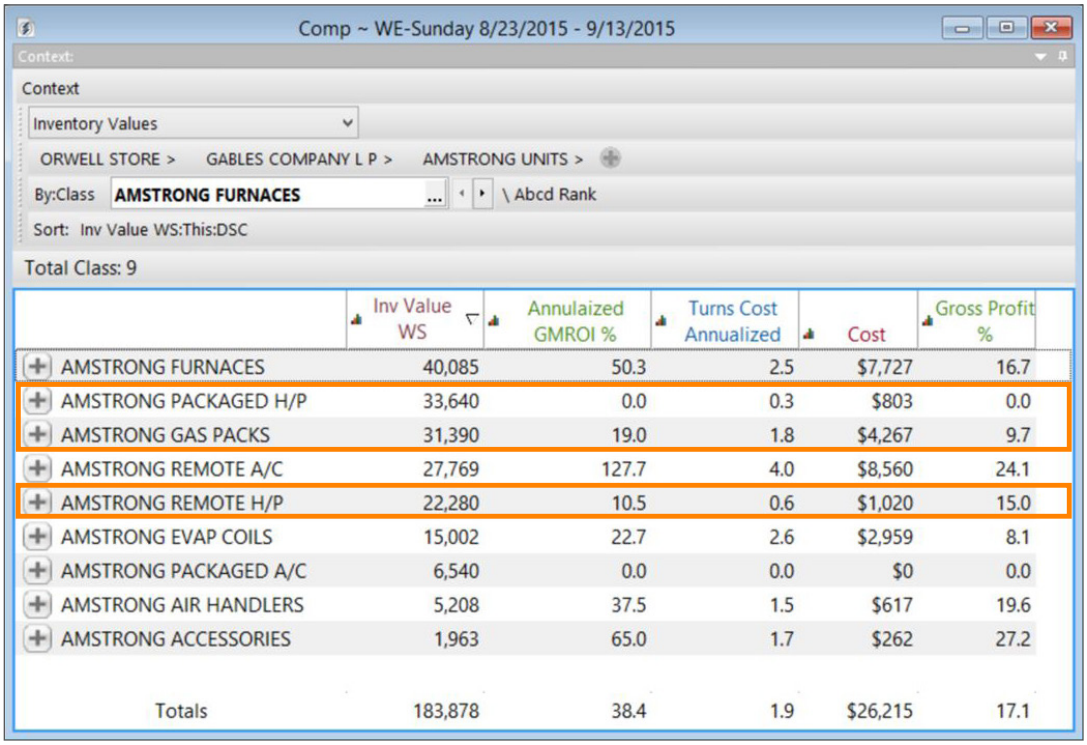


We drill into Vendors and Products to determine slow moving, excess, low inventory turns, and/or low GMROI culprits. Gables has an average of 33% of the inventory, lower than average GMROI, low inventory turns, and more than 25% of the COGS (Sales). Thus we investigate their products.



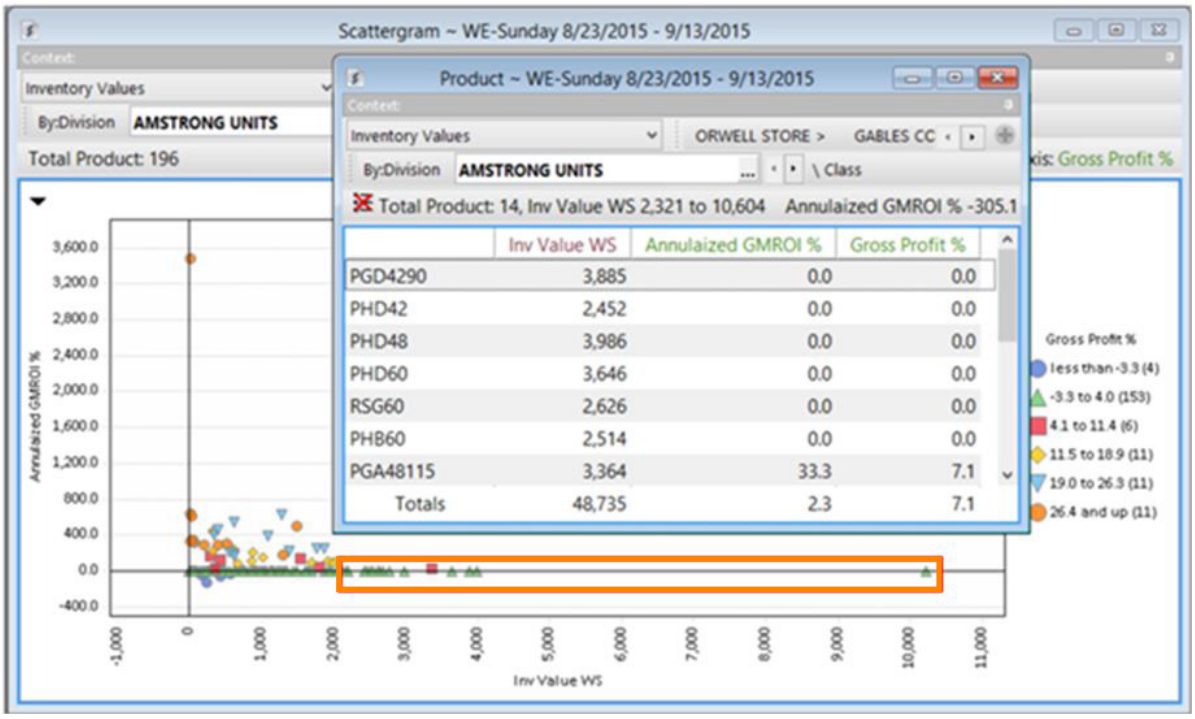
	Inv Value WS	Annulaized GMROI %	Turns Cost Annualized	Cost	Gross Profit %
GABLES COMPANY L P	199,997	40.1	1.8	$28,203	17.9
U-CS PRODUCTS GROUP	128,324	37.5	1.4	$13,917	21.0
ASPEN AIR, INC.	47,223	9.0	0.6	$2,158	13.2
AIR - CARE PRODUCTS INC.	29,481	171.0	4.6	$10,364	27.2
HALL DAVID CONTROLLER	19,397	36.0	1.2	$1,781	23.1
SHERMAN FISHER CO	15,593	41.7	1.4	$1,659	23.1
WARREN FURNACE COMPANY	13,886	52.5	1.2	$1,329	29.6
REDFORD AMERICA CORP	11,222	60.3	1.8	$1,528	25.4
STEWART HVAC PRODUCTS	10,414	15.6	0.6	$488	20.4
STANLEY CREST SALES, INC.	10,381	197.2	6.5	$5,214	23.2
Totals	606,450	93.8	2.4	$112,317	28.0

Focusing on Armstrong Units, we find a few high Inventory $, low inventory turns products – each will have their own unique "story". Are products stocked due to customer requirements?; Are they new products that haven't sold yet? Were they stocked due to forecast, but business has changed? Etc., Etc.



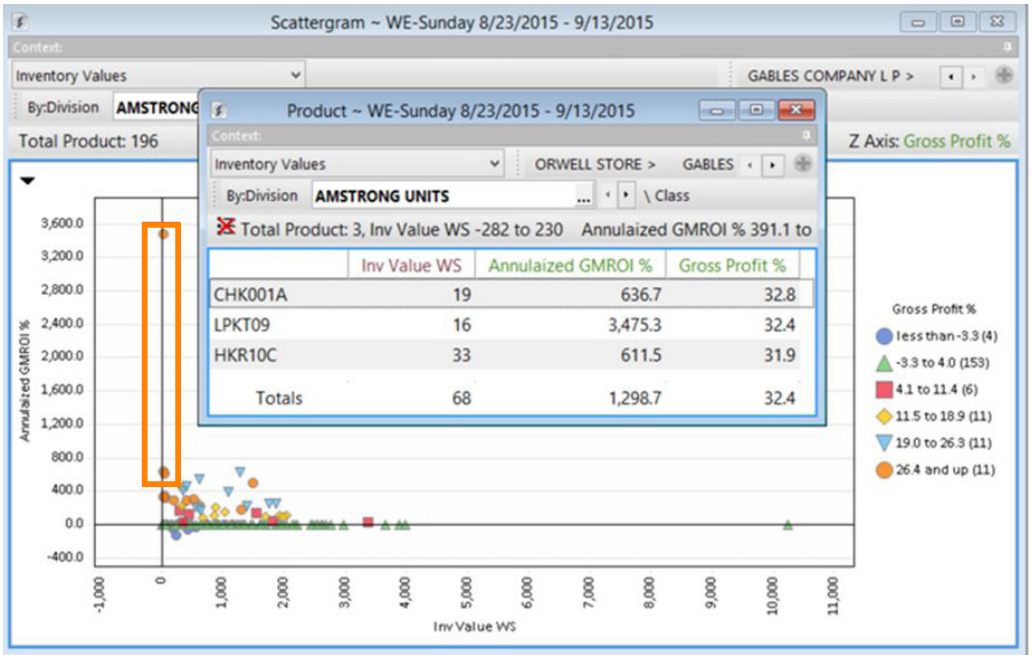
	Inv Value WS	Annulaized GMROI %	Turns Cost Annualized	Cost	Gross Profit %
AMSTRONG FURNACES	40,085	50.3	2.5	$7,727	16.7
AMSTRONG PACKAGED H/P	33,640	0.0	0.3	$803	0.0
AMSTRONG GAS PACKS	31,390	19.0	1.8	$4,267	9.7
AMSTRONG REMOTE A/C	27,769	127.7	4.0	$8,560	24.1
AMSTRONG REMOTE H/P	22,280	10.5	0.6	$1,020	15.0
AMSTRONG EVAP COILS	15,002	22.7	2.6	$2,959	8.1
AMSTRONG PACKAGED A/C	6,540	0.0	0.0	$0	0.0
AMSTRONG AIR HANDLERS	5,208	37.5	1.5	$617	19.6
AMSTRONG ACCESSORIES	1,963	65.0	1.7	$262	27.2
Totals	183,878	38.4	1.9	$26,215	17.1

Viewing GMROI% vs Inventory $ vs. Gross Profit % highlights poorly managed parts – slow moving



	Inv Value WS	Annualized GMROI %	Gross Profit %
PGD4290	3,885	0.0	0.0
PHD42	2,452	0.0	0.0
PHD48	3,986	0.0	0.0
PHD60	3,646	0.0	0.0
RSG60	2,626	0.0	0.0
PHB60	2,514	0.0	0.0
PGA48115	3,364	33.3	7.1
Totals	48,735	2.3	7.1

Viewing GMROI% vs Inventory $ vs. Gross Profit % highlights extremely well managed parts.



	Inv Value WS	Annualized GMROI %	Gross Profit %
CHK001A	19	636.7	32.8
LPKT09	16	3,475.3	32.4
HKR10C	33	611.5	31.9
Totals	68	1,298.7	32.4

Conclusion

While OSCE is one metric, it encompasses a broad set of variables that ultimately determine the capabilities of the respective supply chain scope. The business impact of OSCE improvement can be very significant. OSCE not only tracks the performance of the supply chain, it also provides insight as to areas of improvement which can have the greatest impact on the top and bottom lines of the business, and overall productivity of all entities. OSCE improvement drives significant profitability and productivity improvement, as well as increased asset utilization. And, more importantly, results in greater customer satisfaction.

So What? – Alignment of OSCE to your business objectives will enable a significant impact to your bottom line by, not only giving you an indication of how you are tracking on the metric, but also providing a path for continuous improvement. By understanding the business impact of each action, you will focus your resources most effectively.

Eric Frantz – VP, Value Assurance

- 30+ years in management and consulting positions with Salient, Cincinnati Milacron, Ernst & Young, Goulds Pumps ITT, Xelus, eLogic Group, QAD, Infor
- Focused career on Business Case - business change to Value
- University of Cincinnati - BS Mechanical Eng, MBA Operations Mgt
- Certified in Production and Inventory Management (CPIM) with The Association of Operations Management (APICS)

Eric has held management and consulting positions with Salient, Cincinnati Milacron, Ernst & Young, Goulds Pumps ITT, Xelus, eLogic Group, QAD, Infor and as an independent. He has focused much of his career on the translation of business objectives and policies into individual contributor actions.

Eric has developed unique techniques in mapping Value to business change, both in the capital appropriation process and through performance management systems. This entails knowing how to speak the C-Level language AND ensuring people understand their alignment to the company goals.

About Salient

Salient Management Company offers business and government a new solution for efficient management. Drawing on diverse data from multiple sources, Salient's technology measures how business activity creates value, quality, financial efficiency and productivity, while the user eliminates barriers to using this knowledge for continuous improvement.

Salient provides the world's most advanced performance accounting and decision support systems. Founded in 1986, Salient today serves more than 115,000 users in 61 countries.

For more information, visit www.salient.com.

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