

2.2 Methodologies for Assessing Demand Driven Supply Chain

In terms of methodologies to assess and identify company's performance, several articles show the importance of having a structured process in order to improve performance overtime. However, when it is specifically related to methods for assessing performance based on Demand Driven Supply Chain (DDSC) concepts, the articles available do not meet the research criteria which is to have a clear and practical framework to support companies identify their current state based on DDSC concepts.

Dale and Ritchie (2000) argue that companies must have an appropriate performance measurement system to be applied on a regular basis to identify areas to be improved in order to establish a sustainable continuous improvement process. They proposed to use self-assessment process, which can be defined as a comprehensive, systematic and regular review of an organization's activities and results against a model of business excellence. The self-assessment will allow organizations to clearly discern its strengths and gaps, and define improvement actions linked to the business planning process.

They state that there are some necessary criteria for a successful self-assessment process:

- Gaining commitment and support from all levels of staff
- Action being taken from the previous self-assessment
- Incorporation of self-assessment into the business planning process
- Not allowing the process to be "added on" to employees existing workload
- Developing a framework for performance monitoring

In terms of benefits of the self-assessment, there are both immediate and long term benefits:

Immediate benefits:

- Facilitates benchmarking, drives continuous improvement, encourages employees involvement and ownership, provides visibility in direction, raises understanding and awareness of quality related issues, develops a common approach to continuous improvement across the company.

Long term benefits:

- Keeps costs down, improves business results, provides a disciplined approach to business planning, increases the ability to meet and exceed customers' expectations.

Chin et al. (2003) also developed a knowledge-based expert self-assessment (KES) training toolkit to measure and assess organizational performance based on the evaluation criteria of the renowned business excellence model – The Malcolm Baldrige National Quality Award (MBNQA).

The concept of self-assessment brings a valuable contribution to reduce complexity, time and cost to apply the DDSC assessment framework on a global basis, as each company should be able to self-assess its current state.

Salama et al. (2009) review the importance of supply chain and operations audit process which represents a fundamental step to support improvement projects. They argue that the core element of audits is the diagnostic stage and that no audit can be considered successful unless it really provides a thorough understanding of how the constituent elements of an organization interact with one another (e.g., people, processes and technologies), that is the interactions which constrain the system, and how these interactions are reflected on the market-driven performance. They provided a very clear set of features and requirements for an audit methodology that can be considered when developing a DDSC assessment:

- Quick/Accurate – The methodology should be based on tools, steps and an “engine” which were designed to deliver a result as accurate as possible in the shortest time possible.
- Not invasive – The methodology should be built in order to require the least possible effort from organization’s resource.
- Scalable – The methodology should be scalable.
- Avoid bias/theoretically grounded – The methodology should be built in a way to reduce possible bias in the diagnostic stage, while exploiting the knowledge that people who daily work in an organization have on their processes.
- Stimulate consensus building – The stimulation of consensus building can be achieved in different ways. The most important are:
 - Possible recycles in the diagnostic stage
 - Empirical support of critical findings
 - Quantification of value together with scenario analysis
- Transparent – All tools and steps used in the methodology should be clearly described in all parts. No “secret engine” is behind the methodology.

The proposed new audit methodology by Salama et al. (2009) were tested through three European research initiatives, and also showed an example of a master best practice relationship map for the demand management process.

Moon (2002) also provides direction on the importance of auditing process related to sales forecasting. He states that sales forecasting audit process has three objectives:

- Understand current status of forecasting practice (a company’s “as is” state).
- Visualize the goals of forecasting process improvement (the “should-be” state).
- Develop a roadmap for achieving the goals (the “way forward”).

Trkman and McCormack (2009) describe that supply risk or supply disruptions is emerging as a key challenge to supply chain management, and that the ability to identify which supplier has greater potential of disruption is a critical step in managing the frequency and impact of these disruptions.

Their contribution was to use the contingency theory approach to propose a new method for the assessment and classification of suppliers based on their supply chain characteristics, its structure and supplier’s attributes and performances, modified by factors in the supplier’s specific environment namely exogenous and

endogenous uncertainty. The contingency approach is a value contribution to be considered when developing the DDSC assessment framework as different companies and industries can have different time and market requirements to move or not to move towards DDSC.

Filho et al. (2010) developed a framework to measure safety culture in the Brazilian oil and gas companies. They applied a five level safety culture maturity model (e.g., pathological, reactive, bureaucratic, proactive and sustainable) using five dimensions (e.g., information, organizational learning, involvement, communication and commitment) to identify current state of safety practices in petrochemical companies.

A maturity model can be described as a structured collection of elements that describe certain aspects of maturity in an organization, and aids in the definition and understanding of the different organization processes. A maturity model can be a valuable tool to describe the different maturity levels in the DDSC assessment process.

One of the key objectives of DDSC is to reduce demand amplification as it brings extra costs and inefficiencies like extra resource capacity, higher inventory levels, etc. Taylor (2000) reviews the effect of demand amplification in the supply chain and also proposes a practical approach to eliminate it through a seven step process. A pilot test was performed in UK automotive industry and showed an increase from 70 to 100% on the composite measure of delivery to time along the supply chain, and also a reduction of 30% in total supply chain inventory.

Childerhouse et al. (2002) proposed a methodological framework to develop focused demand chain strategy for each cluster of products commercialized by a company. The methodology consists of six steps described below and has the objective to define the best facility, production layout requirements and control mechanisms for each specific product/service offered by the company.

- Step 1: Develop holistic demand chain strategy. This leads from highlighting of core competencies and resources, and its primary purpose is the identification of specific markets to be targeted plus the overall corporate strategy.
- Step 2: Identify specific product/service offering. These are tailored to the target markets with emphasis placed on prioritization of service, quality, cost or lead times.
- Step 3: Categorize demand chain types. Given the specific products and their related service criteria, the DWV3 classification variables (duration of lifecycle, time window for delivery, volume, variety and variability) are used to categorize the products into clusters with similar characteristics. Output is a clear definition of the requirements for each demand channel.
- Step 4: Identify facility requirements. Facilities need to be tailored to achieve the desired objectives (e.g., products with high service level may require distribution warehouses located near the marketplace).
- Step 5: Define production layout and control mechanisms (e.g., Kanban, MRP, etc.).
- Step 6: Implement focused demand chains.

The proposed methodology was applied to a UK lighting company and showed several benefits like 75% reduction in product development time, 27% reduction in manufacturing costs, and 95% reduction in delivery lead times.

Bowersox and Lahowchich (2008) propose a Responsive Supply Chain Business Model and describe it as a “...customer-facing organization and operational strategy focusing the highest priority on providing exacting and sustainable customer service...”. They explain that the Responsive Supply Chain business model represents a blend of six imperatives, or essential elements (1) Consumer connectivity, (2) Operational excellence, (3) Integrative management, (4) Real-time responsiveness, (5) Leveraging networks, and (6) Collaboration, and each of these six imperatives represents a firm’s unique supply chain DNA.

Verdouw et al. (2010) analyzed the European fruit market and identified that fruit supply does not sufficiently meet demand requirements. They proposed that the fruit supply chains needed to become demand driven, that is, being able to continuously match supply capabilities to changing demand requirements. In a demand driven supply chain, all actors involved are sensitive and responsive to demand information of the ultimate consumer and meet those varied and variable demands in a timely and cost-effective manner. As a consequence, information must be shared timely throughout the supply chain and the early alerted firms have to respond quickly to changes in demand or supply, which imposes stringent demands on the interoperability and flexibility of the enabling information systems.

They presented a reference model for designing business processes in demand-driven fruit supply chains. The model consists of a reference modeling framework that defines process models at different levels of abstraction and includes a method of how they can be composed from a repository of building blocks. However, they did not provide any structured assessment approach to evaluate different business segments/industries in light of demand driven supply chain concepts.

Georgiadis et al. (2001) present a paper describing the design and implementation of a demand driven freight transport application, but they focus mainly in the IT system architecture of the solution, called ATLog (Attika Traffic Logistics), not providing any direction on how to assess and determine a company current state based on DDSC concepts.

Ayers and Malmberg (2002) touch very briefly DDSC concepts, providing a four stage maturity model to show how enablers of supply chain improvement support the introduction of information technology to the supply chain, and one of these elements is the demand-driven as illustrated in Fig. 2.8 below. However, they did not provide a detail maturity model and a robust methodology to assess a supply chain, in order to determine its current state in terms of the demand driven concepts.

Table 2.2 below provides a summary of the current literature review on assessing DDSC:

Exhibit 3. Enablers of Supply Chain Improvement				
	Stages of Supply Chain Evolution			
	1	2	3	4
	Infrastructure	Cost Reduction	Collaboration	Strategic Contribution
Supply Chain Organization	Capability building Execution of basic tasks	Root cause analysis Item stratification "Optimal" buys	Intercompany improvement programs Financial sharing arrangements	Customer-focused organization structures along supply chain Supply chain level steering committees
Demand-Driven Supply Chain	Supplier reduction Negotiations Mostly forecast driven; backorder and simple service level indicators	Quality systems Outsourcing Supplier ratings Lead-time reduction (cells, small batches) Modest JIT/pull arrangements; 25 % of demand-driven potential	Design changes Postponement strategies Information exchange (inventories, forecasts, demand) 50 % application of demand-driven potential	Segment strategies New product involvement 80–90% implementation of demand-driven potential

Fig. 2.8 Enablers of supply chain improvement (Ayers and Malmberg 2002)

Table 2.2 Summary current literature review on DDSC

Author(s)	Contribution
	Proposed to use self-assessment process to evaluate company's performance on a regular basis as part of the continuous improvement process
Dale and Ritchie (2000)	Developed a knowledge-based expert self-assessment (KES) training toolkit to measure and assess organizational performance
Chin et al. (2003)	Review the importance of supply chain and operations audit process
Salama et al. (2009)	Provides direction on the importance of auditing process related to sales forecasting
Moon (2002)	Argue that supply risk is one of key challenge to supply chain management and propose a new method for assessment and classification of suppliers
Trkman and McCormack (2009)	Developed a five level maturity model to measure safety culture in the Brazilian oil and gas companies
Filho et al. (2010)	Reviews the effect of demand amplification in the supply chain and also proposes a seven step process to eliminate it
Taylor (2000)	Proposed methodological framework to develop focused demand chain strategy for each cluster of product commercialized by a company
Childerhouse et al. (2002)	
Bowersox and Lahowchich (2008)	Propose a responsive supply chain business model
Verdouw et al. (2010)	Proposed a reference model for designing business processes in demand driven fruit supply chain in Europe
Georgiadis et al. (2001)	Describe the design and implementation of demand driven freight transport application
Ayers and Malmberg (2002)	Provide a four stage readiness model to show how enablers of supply chain improvement support the introduction of information technology to the supply chain

In this book, it is proposed to define the components of DDSC, then develop a structured methodology that will help companies assess their current state in light of demand driven supply chain concepts and identify their current strengths and gaps, and therefore, define a strategic plan to evolve and become more efficient and competitive.

2.3 Benefits of Demand Driven Supply Chain

Despite of the limited information available on the benefits of becoming demand driven, two different studies provide a direction on the financial and operational benefits companies can capture when implementing a demand driven supply chain.

Based on internal benchmark data, AMR reports that the most advanced demand-sensing companies have 15% less inventory, 17% better perfect order performance, and 35% shorter cash-to-cash cycle time. In terms of top line results, DDSC leaders have 10% higher revenue and 5–7% better profit margins than their competitors. These extraordinary results captured by demand-driven companies, show the importance of having a structured methodology for assessing the current state against DDSC concepts, in order to help companies evolve in the implementation of DDSC components and tactics.

Another reference comes from SAP (SAP Insight report 2006), which argues that based on existing customer studies, analyst comments and industry pooling, the implementation of DDSC can generate the following results:

Revenue: Increase fill rates (defined as cases delivered divided by cases ordered) and reduce out-of-stocks by 3–10%:

Operating cost:

- Increase production efficiencies by 1–5%
- Decrease freight costs by 5–15%
- Improve personnel productivity by 7–12%
- Reduce obsolescence and waste by 35–50%

Working capital:

- Reduce inventory levels by 7–15%
- Improve asset utilization by 10–15%
- Decrease cash-to-cash cycle by 10–30%

As it could be seen, there are great benefits on becoming DDSC, but the question that most companies face is *how to rapidly evolve from current state in the direction of demand-driven supply chain*.

References

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