

Supply chain management practices: a classification based on the literature review

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Abstract

Researches focused on supply chains have gained relevance from 1990's due to the opportunities of adding value to the companies through SCM - Supply Chain Management. The correct understanding of practices applied on this management is very important to obtain a better performance in a supply chain. Thus, this study will present the practices that can support companies achieving higher level of maturity in their supply chain management. As research method a systematic literature review was adopted aiming to identify practices for SCM proposed in the literature. The main contribution of this paper is to propose a classification of these practices in terms of supply chain management dimensions.

Keywords: Supply Chain, Management, Practices.

Introduction

The study of practices on Supply Chain Management (SCM) improves the understanding of how all the process are integrated in way to provide products, services and information that add value for costumers (Cooper et al., 1997). The purpose of this paper is highlighting the practices that can provide the maturation of the tiers on supply chain in every dimension. More than have a goal in operations, companies need to understand how to improve their supply chains.

Literature Review

The research was focused on recent articles that present studies related to practices on Supply Chain Management and Supply Chain Maturity, aiming understand which practices are helping companies to achieve better performance and maturity, and which areas have been developed in the process.

Supply Chain Management Practices

Supply chains integrate several areas and so several actors with divergent interests. The main challenge is conciliate all the expectations and provide the appropriated level of service and quality for the customers.

Koh et al (2007) states that SCM's practices involve a set of activities undertaken by organization to promote effective management of their supply chain. Tutuncu and Kucukusta (2008) go beyond that and states that SCM lead to changes in the structure of the organization by integrating internal functions and linking these with the external operation of suppliers, customers and others stakeholders of the supply chain.

The study presents that there is an extensive range of practices to be explored. Since the practices about forecasting, inventory, collaboration, development of warehouses, hub, site factories and besides that there is not a recent research treating all those dimensions of management.

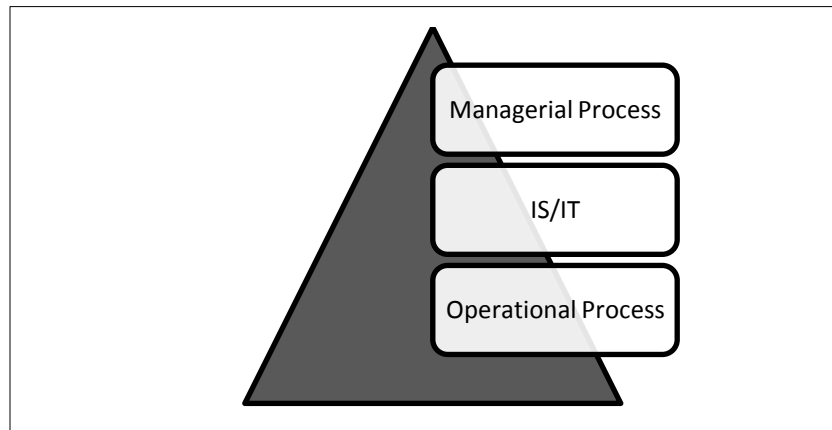
Talib et al (2011) worked on a project to link the TQM – Total Quality Management-practices to SCM practices as showed by Table 1. A set of 12 practices applicable to different organization were identify above 50 TQM practices and 90 SCM practices. Authors indicate that implementation of these TQM and SCM practices in the organization will result in many desirable outcomes and benefits such as customer satisfaction; JIT delivery and reduced cycle time.

Table1 – Talib et al (2011) practices

TQM practices	SCM practices
Top-management commitment	Customer relationship
Customer focus	Material management
Training and education	Strategic supplier partnership
Continuous improvement and innovation	Information and communication technologies
Supplier management and	Corporate culture and
Employee involvement.	Close supplier partnership

Regarding innovation on supply chain, Ageron et al (2013) defended a model in which the practices are separated by 3 levels according to Figure 1: On the top of the pyramid, the managerial process, under that, Information Sharing and Information technologies and for the base the Operational process. Almost 70 practices were found out using a sample of 68 supply chains.

Figure 1 – Ageron et al. (2013) pyramid of practices level.



Jabbour et al (2011) realized a survey with 107 Brazilian companies and statistics techniques were employed to build four new dimensions by mapping 22 practices for four constructs of Supply Chain Management namely:

- Supply chain (SC) integration for production planning and control (PPC) support;
- Information sharing about products and targeting strategies,
- Strategic relationship with customer and supplier, and
- Support customer order.

A more complex study of practices is presented by Prajogo and Olhager (2012). Due the globalization and specialization of the firms supply chain integration has become one of the most important fields of study as the performance. Integration has at least two strands: the logistics integration, refers to specific logistics practices and operational activities that coordinate the flow of materials from suppliers to customers throughout the value stream (Stock et al., 2000), and the information integration which refers to the sharing of key information along the supply chain network which is enabled by information technology (IT). Prajogo and Olhager (2012) captures the three principal elements of an integrated supply chain suggested by Handfield and Nichols (1999), as seen below:

- Information flow
- Product and material flows
- Long term relationships between supply chain partners.

Zhou and Benton Jr (2007) work on six practices to study the impact on supply chain dynamism and delivery performance. The practices are listed below:

- Plan
- JIT Production
- Delivery practice
- Information sharing support technology
- Information content
- Information quality

With regards to Lean practices and Supply Chain Performance, Zaman and Ahsan (2014) states that Lean is applicable in many supply chains, particularly those seeking to improve performance by reducing waste. Cost competitive supply chains can benefit from utilizing lean to remove waste and reduce costs. The lean supply chain can mitigate the lack of co-ordination between performance measures and lean tools and techniques.

Supply Chain Management Maturity

The maturity models consider different elements in their scales of maturity like inter-organizational supply chain relationships (Pache´ and Spalanzani, 2007), the ability to manage full scope of a supply chain, in which is based the BOM/SCOR- Business Operational Model/Supply Chain Operations Reference-, or on description of the process that must be implemented to achieve excellence which corresponding to the maximum level of maturity, as the CMMI - Capability Maturity Model Integration and the model proposed by Frederico and Martins (2011). Table 2 presents the main approaches of maturity for supply chain management considered on the literature.

Table 2 – Models of maturity of SCM and the levels

Maturity model	Maturity levels
Frederico and Martins (2011)	1. Initial: Prevalence of high costs in the supply chain, low customer satisfaction, unstructured and disintegrated process, lack of collaboration among members, absence of technology and tools for forecasting and others activities, lack of strategy focus on supply chain, project management in the supply chain barely active, lack of risk management, absence of measurement through the supply chain, lack of regulation and credits line as elements of support and use of common basic resources.
	2. Intermediate: Efforts to reduce costs, average customer satisfaction, documented and defined process initializing a more horizontal focus along the chain, cooperation spirit among functions related to the supply chain management at focus company, use of technologies and statistics tools to forecasting and another activities, supply chain as strategic focus, conscience, vision and competency in supply chain management by employees, best practices on project management, beginning on risks management, existence of performance measurement, begging of regulation and credit lines for adequate resources, however without differential on supply chain.
	3. Advanced: Excellence in costs, total focus on client and high level of satisfaction, process totally integrated and structured, extensive use of information systems, sharing information with stakeholders, excellence on project management, extensive performance measurement, supply chain seen as a competitive factor among the competitors, responsive action before the demand variations caused by customers, extensive regulation and fomentation for credit lines.
Capability Maturity Model Integration (2004)	1. Initial: the processes are neither defined nor standardized and the performance is not evaluated regularly.
	2. Managed: the processes being implemented are planned, executed, supervised, controlled, reviewed and assessed. The resources associated with the use of these processes are effective and possess the wherewithal that will allow them to realize the processes in question.
	3. Defined: the processes are standardized and improved and used by the whole of the organization—whose own objectives will also be defined.
	4. Quantitatively managed: the organization sets performance objectives for the processes. The objectives are linked to organizational, but also customer demands. Outcomes are measured quantitatively.

	5. Optimizing: the processes are continually improved through an analysis of the causes for any variations in performance.
Business Operation Model (2002)	1. Ad hoc: The supply chain and its practices are unstructured and ill-defined. Process measures are not in place. Jobs and organizational structures are not based on horizontal supply chain processes. Process performance is unpredictable. Targets, if defined, are often missed. SCM costs are high. Customer satisfaction is low. Functional cooperation is also low.
	2. Defined: Basic SCM processes are defined and documented. Jobs and organization basically remain traditional. Process performance is more predictable. Targets are defined but still missed more often than not. Overcoming the functional silos takes considerable effort owing to boundary concerns and competing goals. SCM costs remain high. Customer satisfaction has improved, but is still low
	3. Linked: This represents the breakthrough level. Managers employ SCM with strategic intent and results. Broad SCM jobs and structures are put in place outside and on top of traditional functions. Cooperation between intra-company functions, vendors and customers takes the form of teams that share common SCM measures and goals that reach horizontally across the supply chain. Process performance becomes more predictable and targets are often achieved. Continuous improvement efforts take shape focused on root cause elimination and performance improvements. SCM costs begin decreasing and feelings of esprit de corps take the place of frustration. Customers are included in process improvement efforts and customer satisfaction begins to show marked improvement.
	4. Integrated: The company, its vendors and suppliers, take cooperation to the process level. Organizational structures and jobs are based on SCM procedures, and traditional functions, as they relate to the supply chain, begin to disappear altogether. SCM measures and management systems are deeply imbedded in the organization. Advanced SCM practices, such as collaborative forecasting and planning with customers and suppliers, take shape. Process performance becomes very predictable and targets are reliably achieved. Process improvement goals are set by the teams and achieved with confidence. SCM costs are dramatically reduced and customer satisfaction and esprit de corps become a competitive advantage.
	5. Extended: Competition is based on multi- firm supply chains. Collaboration between legal entities is routine to the point where advanced SCM practices that allow transfer of responsibility without legal ownership are in place. Multi-firm SCM teams with common processes, goals and broad authority take shape. Trust, mutual dependency and esprit de corps are the glue holding the extended supply chain together. A horizontal, customer-focused, collaborative culture is firmly in place. Process performance and reliability of the extended system are measured and joint investments in improving the system are shared, as are the returns.

The model proposed by Frederico and Martins (2011) is based on Lockamy III e McCormack (2004), but also consider a few more authors to build a more robust framework of constructs. Ten dimensions are considered for managing the supply chain, which will help executives identify which areas within their companies need more assistance and support for the development and improvement of its practices. The dimensions are listed below:

- **Costs:** This dimension is associated to the level of costs and stock in supply chain;
- **Customer:** It is associated to the focus on customer on the supply chain management as is linked to the level of satisfaction of the clients;
- **Processes:** Refers to formalization, integration and structure of the process through the supply chain;

- **Technology and Tools:** It is associated to the existence of Information systems and tools to support the management, such as statistics tools and forecasting;
- **Collaborative:** Refers about sharing information, communication, share/repass resources and all kind of joint initiatives through the supply chain as development of new products and production planning;
- **Management:** It is associated to the experience level on projects management through supply chain, risks management, and also the management of consciousness and capacity;
- **Performance Measurement:** Associated to the extension of measurement performance;
- **Strategy:** Refers to strategic intention gives to supply chain by the company focus of the supply chain and their members;
- **Responsiveness:** Associated to velocity which the supply respond to environment changes, requiring a service in terms of volume and mix of product;
- **Resources:** Refers to all kind of resources used on supply chain, combined in two category: commons (necessary to execution of the process) and competitive (generates competitive advantage and it is hard to be copy by other companies due their differential).

The models referenced above (Table 2) has some levels of maturity that a supply chain has to pass through to become more efficient and profitable, however most of them has many levels that can be characterized as grey areas of the basic levels that are: Initial, Intermediate and Advanced, and can be easily identified and worked by the practioners. Due the readiness of the basic levels and extension and clarity of dimensions of the Frederico and Martins (2011) model, the practices found by the literature review will be classified based on this model.

Main Findings

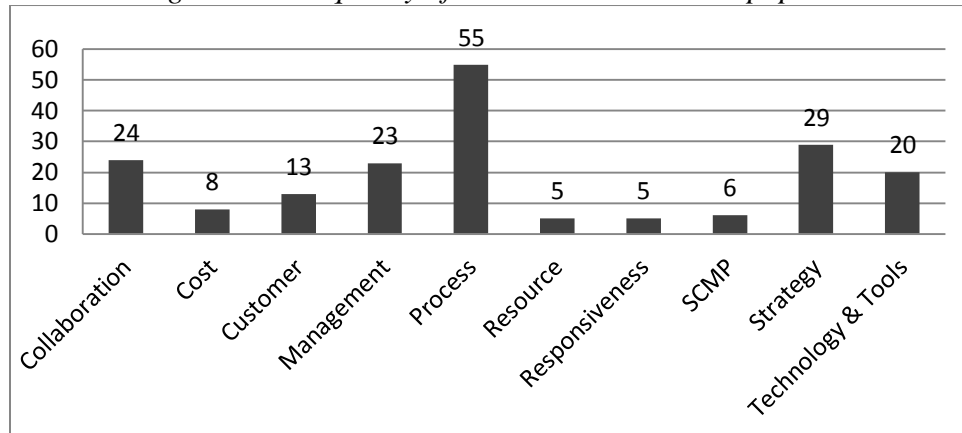
The study provides a selection from literature review of 188 practices. The practices are classified using the ten dimensions of Frederico and Martins (2011) model. It is also presented a framework with the frequency of each dimension in this literature review, bringing to the light the fields that can be more studied yet.

Figure 2 shows the frequency of practices considered on the literature according to each maturity dimension. Based on the Figure 2, process (29,3%), strategy (15,4%) and collaboration (12,8%) are the most studied dimensions on Supply Chain Management according to research, corresponding to 57,5% of the practices found. One of the reasons for that can be explained by Chandra (2006) which states that supply chain integration, optimization and excellence have become the goal and focus of many organizations worldwide and depending on how and why the supply chain has been developed companies must follow one of these directions:

- A network for efficient management of demand and flow of products and services;
- A philosophy of conducting business; and

- A strategy to gain competitive advantage through co- ordination and synchronization of actions of its members.

Figure 2 – Frequency of the dimensions on the papers.



As showed on Table 3, Ageron (2013), Zaman and Ahsan (2014) and Kuei et al. (2001) have the most complete researches regarding dimensions and it is because the object of study are practices that helps companies develop innovation culture, lean philosophy and the process of measurement on supply chain. The common dimensions are almost the same three most common on the papers being that only strategy was substituted by management. On the other hand, all ten dimensions were found on those three articles.

Table 3 – Presence of dimensions on the papers

Papers	Dimensions									
	Collaboration	Cost	Customer	Management	Process	Resource	Responsiveness	SCMP	Strategy	Technology & Tools
Ageron et al. (2013)	*			*	*	*	*		*	*
Arif-Uz-Zaman and Ahsan (2014)	*	*		*	*		*	*		*
Jabbour (2011)	*	*	*						*	
Koh et al. (2007)	*		*		*	*	*		*	
Kuei et al (2001)	*		*	*	*	*		*	*	
Zhou and Benton Jr. (2007)				*	*			*	*	*
Jabour et al (2014)				*	*					
Rexhausena et al. (2012)	*	*		*					*	
Dyer and Nobeoka (1998)	*			*	*					
Talib et al. (2011)	*		*		*	*				
Chin et al (2006)	*			*	*			*		*
Laosirihongthong et al. (2013)					*				*	
Chen and Paulraj (2004)	*			*					*	
Flynn and Flynn (2005)					*				*	*

The main practices found out in this collection refers to Process and more specific about JIT practices and Lean Manufacturing, such as 5S, standardized work, implementation of panel for visual management, cellular manufacturing, Kanban system of supply, creation of multifunctional teams to discuss since new products, market strategy and process.

Collaboration is the second most present dimension in the articles and the reason for it could be the nature of relationship between suppliers and customers in every level. Some practices like development and harmonization of a supplier base, sharing information about planning schedules, forecasting and integrated quality programs. These initiatives to integrate the tiers on supply chain can be interpreted as a need for relationship management that should result in more effective use of the combined resource base together with better integrated information and material flow (Childerhouse e. al, 2011).

Lastly, the dimension strategy contemplates decisions about location of the site factories, hubs, warehouses, safety stock, outsourcing, existence of reverse logistics and green practices. The combinations of this decision define the differential and competitive advantage on the supply chains.

Final Remarks

This study is the first step towards a comprehension about practices on supply chain and the relation with the management maturity. A systematic literature review was used as a method to obtain findings related to practices and maturity dimensions.

It was possible identify that the recent researches about practices are more focused on three dimensions of maturity management: process, strategy and collaboration. The study about practices related to costs and inventory on supply chain could have a more holistic view, so as responsiveness, customer satisfaction and measurement performance, whereas seek performance as a whole could be better than the sum of the parts.

Next steps of the research are necessary to try understanding better the relationship between practices and maturity dimensions on supply chain management. A deep study involving a field research about what are the practices linked to each dimensions of maturity and how the companies are executing them to achieve better level of performance will be done.

References

- Ageron, B., Lavastre, O., Spalanzani, A., (2013), "Innovative supply chain practices: the state of French companies", *Supply Chain Management: An International Journal*, Vol. 18 Iss 3 pp. 265 – 276
- Arif-Uz-Zaman, K. and Ahsan, A., (2014), "Lean supply chain performance measurement", *International Journal of Productivity and Performance Management*, Vol. 63 Iss 5 pp. 588 - 612 Permanent
- Chandra, C. and Kumar, S. (2000), "Supply chain management in theory and practice: a passing fad or a fundamental change?", *Industrial Management & Data Systems*, Vol. 100 No. 3, pp. 100-13
- Childerhouse et al. (2011), "Supply chain integration: an international comparison of maturity", *Asia Pacific Journal of Marketing and Logistics*, Vol. 23 Iss 4 pp. 531 - 552, 2011
- ChristopheR, M. "Logistics and Supply Chain Management". 3rd ed. *London: Pearson Education*, 2005
- Cooper, M.C., Lambert, D.M. & Pagh, J.D. (1997). "Supply chain management: More than a new name for logistics". *International Journal of Logistics Management*, 8 (1), 1–14.
- Estampe, D., Lamouri, S., Paris, J., Brahim-Djelloul, S., (2013), "A framework for analyzing supply chain performance evaluation models", *International Journal of Production Economics*, Vol. 143 Iss. 2 pp. 247-258
- Faisal Talib Zillur Rahman M.N. Qureshi, (2011), "A study of total quality management and supply chain management practices", *International Journal of Productivity and Performance Management*, Vol. 60 Iss 3 pp. 268 - 288
- Frederico, G., Martins, R., (2012), "Model for alignment between performance measurement systems and maturity of supply chain management", *Gestao e Producao*, Vol. 19 Iss. 4 pp. 857-871
- Ganga, G. M., Carpinetti, L. C., Politano, P. R., (2011), "A fuzzy logic approach to supply chain performance management", *Gestão e Produção*, pp. 755-773
- Handfield, R.B. and Nichols, E.L. Jr (1999), "Introduction to Supply Chain Management", *Prentice-Hall*, Upper Saddle River, NJ.
- Jabbour, A. B., Omodei Jr., J. C., Jabbour, C. J., (2014), "Extending lean manufacturing in supply chains: a successful case in Brazil", *Benchmarking: An International Journal*, Vol. 21 Iss 6 pp. 1070 - 1083 Permanent
- Kazi Arif-Uz-Zaman A.M.M. Nazmul Ahsan, (2014), "Lean supply chain performance measurement", *International Journal of Productivity and Performance Management*, Vol. 63 Iss 5 pp. 588 – 612

- Koh, S.S., Demirbag, M., Bayraktar, E., Tatoglu, E. and Zaim, S. (2007), “The impact of supply chain management practices on performance of SMEs”, *Industrial Management & Data Systems*, Vol. 107 No. 1, pp. 103-24.
- Kuei C, Madu CN, Lin C (2001) “The relationship between supply chain quality management practices and organizational performance”. *Int J Qual Reliab Manage* 18:864–872
- Laosirihongthong, T., Adebajo, D., Tan, K. (2013), "Green supply chain management practices and performance", *Industrial Management & Data Systems*, Vol. 113 Iss 8 pp. 1088 - 1109
- Lockamy III, A., McCormack, K., (2004), "The development of a supply chain management process maturity model using the concepts of business process orientation", *Supply Chain Management: An International Journal*, Vol. 9 Iss 4 pp. 272 - 278
- Lopes de Sousa Jabbour, A., Gomes Alves Filho, A., Blackx Noronha Viana, A. et al. (2011), "Measuring supply chain management practices", *Measuring Business Excellence*, Vol. 15 Iss 2 pp. 18 - 31 Permanent
- Okongwu, U., Morimoto, R., Luras, M., (2013), "The maturity of supply chain sustainability disclosure from a continuous improvement perspective", *International Journal of Productivity and Performance Management*, Vol. 62 Iss 8 pp. 827 – 855
- Pache´, G., Spalanzani, A., 2007 “La gestion des chaines logistiques multi-acteurs: perspectives strate´giques”. *Ed. PUG*.
- Prajogo, D., Olhager, J. (2012), "Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration", *International Journal of Production Economics*, Vol. 135 Iss 1 pp. 514-522
- Rexhausena, D., Pibernikb, R., Kaiserd, G., (2012), "Customer-facing supply chain practices—The impact of demand and distribution management on supply chain success", *Journal of Operations Management*, Vol. 30 Iss 4 pp. 269-281
- Soni, G., Kodali, R., (2013), "A critical review of supply chain management frameworks: proposed framework", *Benchmarking: An International Journal*, Vol. 20 Iss 2 pp. 263 - 298 Permanent
- Tutuncu, O. and Kucukusta, D., (2008), "The Role of Supply Chain Management Integration in Quality Management System for Hospitals", *International Business and Tourism Society*
- Vallet-Bellmunt, T., Martinez-Fernandez, M., Capó-Vicedo, J., (2011), "Supply chain management: A multidisciplinary content analysis of vertical relations between companies, 1997-20", *Industrial Marketing Management*, Vol. 40 Iss. 8 pp. 1347-1367
- Zhou, H., Benton Jr., W.C. (2007), "Supply chain practice and information sharing", *Journal of Operations Management*, Vol. 25 Iss 6 pp. 1348-1365