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"PARADIGMS IN SUPPLY CHAIN MANAGEMENT: A REVIEW"

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ABSTRACT

Companies are constantly looking for ways to increase their effectiveness and improve their bottom lines. One area of renewed interest is supply chain management. By managing their supply chains better, companies are able to become more flexible, offer defect-free products, eliminate unnecessary delays, and keep costs down. This article briefly describes the objectives of supply chain management and lists some supply chain paradigms such as lean, agile, resilient and green. that can be used to achieve them.

KEYWORDS : *Supply chain management, lean SCM, agile SCM, resilient SCM, green SCM*.

I. INTRODUCTION

Supply Chain Management (SCM) has been a topic of interest among organizations. Organizations with a deep understanding of their supply chain may attain successful sources to be a better competitive in the global market.[1] In the definition of SCM it is possible to find a number of issues like cost, time and quality, as well as concepts such as lean, agile and responsiveness, and more recently, vulnerable and resilient [2] and green supply chains [3]. These paradigms have been explored from an independent point of view (usually at a specific production level system organization). However, the understanding of how these paradigms may be integrated in association with the supply chain does not seem to have been deeply explored.

These paradigms (lean, agile, resilient and green) should not be considered alone or in isolation within the supply chain, although sometimes, they show up with opposed characteristics. Neither paradigm is better or worse than the others. Indeed, tradeoffs between these management paradigms may help organizations and their SCs to become more sustainable and competitive. The objective of this research is to analyze if these paradigms are being well integrated at the SCM, putting into perspective additional opportunities for improvement. A better understanding of this process is expected to provide new insights and contributions for further studies.

II. SUPPLY CHAIN PARADIGMS

Market globalization, technology innovation and customized demand are in growing faster [4]. In this context, SCM has become a new and promising way of obtaining competitive advantages in the market [5]. The SCM can be defined as a set of interdependent organizations that act together to control, manage and improve the flow of materials, products, services and information, from the origin point to the delivery point (the end customer) in order to satisfy the customer needs, at the lowest possible cost to all members [6]. Christopher et al. [7] defined SC as "the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services to the ultimate consumer". In addition, providing the right products and services, at the right place, at the right

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time, in the right quantities with the required specifications, to the customer (in an efficient and effective way), must be attended properly to assure a continuous flow in the supply chain [8]. To realize its objective, the supply chain is challenged with an increased number of management paradigms. It is suggested that modern management strategies should address the following paradigms to manage the supply chain. Other pertinent issue in supply chain management is the environmental sustainability. The green supply chain management is as an important organizational philosophy to achieve corporate profit and market share objectives by reducing environmental risks and impacts while improving ecological efficiency of these organizations and their partners.

III. Lean Supply Chain

The Lean management approach, developed by Taiichi Ohno (1998) at Toyota Motor Corporation in Japan, forms the basis for the Toyota Production System (TPS) with two www.intechopen.com Integrating Lean, Agile, Resilience and Green Paradigms in Supply Chain Management (LARG_SCM) 29 main pillars: 'autonomation' and 'just-in-time' (JIT) production. The focus of the lean approach has essentially been on the waste reduction for increasing actual value-added, to fulfil customers needs and maintaining profits.The management system developed by Taiichi Ohno at Toyota Motor Corporation, creates what became known as the Toyota Production System (TPS). TPS has continuously evolved and became known in the West, initially as just-in-time (JIT) production and was subsequently popularized as lean production or lean thinking .lean thinking provides a way to: specify value, determine the best sequence for value-creating steps, perform these activities without interruption when a customer requests them, and continually improve the process. To create a lean SC, it is necessary to examine each process and to identify unnecessary resources which can be measured in costs, time or inventory . Thus, improvements in competitiveness and overall profitability are expected.

IV. Agile Supply Chain

The supply chain objective is to delivering the right product, in the right quantity, in the right condition, to the right place, at the right time, for the right cost. Since customer requirements are continuously changing, supply chains must be adaptable to future changes to respond appropriately to market requirements (and changes). In lean supply chains the focus is on "waste" elimination, but in agile supply chains the focus is on the ability of comprehension and rapid responding to market changes. An agile supply chain has to have the capability to rapidly align its activities and operations for responding to changes in needs of customers and markets, both in terms of volume and variety .The agile chain has a stronger impact on competitiveness in today's business as it enables mobilization of global resources to track evolving changes in technology and material development as well as market and customer expectations. The main key components of agile capabilities are considered to be speed, quality, flexibility and responsiveness "an agile supply chain is an integration of business partners to enable new competencies in order to respond to rapidly changing, continually fragmenting markets.

V. Resilient Supply Chain

Over the last years, there were many types of unpredictable disasters, including terrorist attacks, wars, earthquakes, economic crises, tsunamis, strikes, computer virus attacks, hurricane, storms, extreme weather conditions, diseases, political instability, vandalism, theft, among others. Today's marketplace is characterized by higher levels of turbulence and volatility. When major disruptions occur, many SCs tend to break down and take a long time to recover. "Resilience, in materials science, is the physical property of a material that can return to its original shape or position after a deformation that does not exceed its elastic limit". Here, resilience potentially can be a competitive advantage if you can respond more favorably to disruption than the competition. The resilient paradigm focuses on how well an organization resists to disturbances and how quickly it return to its original state or move to a new one, more desirable, after being disturbed .The frequency of events may be minimized by promoting best practices to increase safety. However, it is impossible to control all risk factors and accidents, and eventually they may happen.

VI. Green Supply Chain

Organizations are becoming aware of environmental issues and global warming. They became even more complicated when entire SCs are considered . Supply Chain Management starts to experience a paradigm shift with the growth of environmental movement, particularly the global consensus about human impact on climate change. Customers will be asking about the products they are purchasing and therefore organizations will have to expect questions about how green their manufacturing processes and supply chain are. Because of this, there is a growing need for integrating environmentally choices into SCM research and practice. Green supply chain management or environmentally sustainable (green) supply chain management has its influence and relationships between SCM and the natural environment .Despite the focus being moving a green supply chain, the goals of visibility, efficiency and cost reduction do not have to be discarded. green SCM can reduce the

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ecological impact of industrial activity without sacrificing quality, cost, reliability, performance or energy utilization efficiency. It involves a paradigm shift, going from end-of-pipe control to meet environmental regulations to the situation of not only minimizing ecological damage, but also leading to overall economic profit.

VII. TRADEOFFS AMONG SUPPLY CHAIN MANAGEMENT PARADIGMS

To develop an efficient and effective supply chain, it is necessary to assess its performance. Performance measures should provide the organization an overview of how they and their supply chain are sustainable and competitive. Kainuma & Tawara (2006) refer that "there are a lot of metrics for evaluating the performance of supply chains. However, they may be aggregated as lead time, customer service, cost, and quality". A lean company means nearly zero inventories; a resilient company must have enough inventories to react to the effects of disruptions that may occur in a supply chain. These concepts seem to be contradictory. However, it would be ideal to have both systems working together in a company. In addition, there is a need to develop a design for environment system, to assure that the production system management is really sustainable and that it continues maintaining its lean benefits.

In this perspective, it is possible to state that the critical dimensions for each paradigm are: cost for lean; service level for agile; time and cost for resilient. Therefore "cost", "service level" and "lead time" were selected as key performance indicators to evaluate the effect of each paradigm in the supply chain performance. These facts advice for further research in production and supply chain management; lean, resilient and green concepts require to be modelled on a compatibility basis. The question is how to increase company resilience, without affecting (or significantly reducing) the maintenance of a lean manufacturing environment.

Many authors report some paradigms mix in the SC. For them the challenges in today's business environment are:

1. How to combine lean practices with an agile response.
2. How to combine lean paradigms when organizations are subject to disruptions and cannot be resilient enough to recover competitiveness.
3. How compatible are green and lean paradigms.
4. How organizations may face obstacles to develop agility and resilience.
5. How resilient paradigm is important so that the organization get to be green.

VIII. CONCLUSION

These four paradigms have the same global purpose: to satisfy the customer needs, at the lowest possible cost to all members in the supply chain. The principal difference between paradigms is the purpose: the lean supply chain seeks waste minimization; the agile supply chain is focused on rapid responding to market changes; the resilient supply chain as the ability to respond efficiently to disturbances; and the green supply chain pretends to minimize environmental impacts. Actual market competition is very aggressive and supply chains must be designed to assure minimum lead time. The challenge in today's business environment, where organizations need to answer to the market volatility, is to combine new paradigms and to integrate them in their supply chains. A state-of-the-art literature review was performed to: identifying the main supply chain practices of each paradigm; the understanding of major tradeoffs between lean, agile, resilient and green paradigms may contribute for a more efficient and sustainable competitiveness of SCs and organizations.

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