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A CONCEPTUAL MODEL FOR SUPPLY CHAIN PERFORMANCE MANAGEMENT AND IMPROVEMENT

Biljana Cvetic*

University of Belgrade, Faculty of Organizational Sciences

Serbia

biljana.cvetic@fon.bg.ac.rs

Dragan Vasiljevic

University of Belgrade, Faculty of Organizational Sciences

Serbia

dragan.vasiljevic@fon.bg.ac.rs

Abstract

Over the past decades, the concepts, models, and tools of supply chain management (SCM) have been getting increasing attention of businessmen and academics. The purpose of this paper is to give a model for supply chain performance management and improvement and to support supply chain members in efforts to achieve a competitive advantage compared to other supply chains. Initiative for the implementation of this model can take focal company, and all the others companies that directly or indirectly doing business with the focal company can struggle to become its key business partners. The proposed model comprises the following phases: selection of key supply chain members; establishing the vision, mission, strategy, and objectives of supply chain; identification of key supply chain processes; development and implementation of the Supply Chain Performance Measurement System (SCPMS); analysis and selection of supply chain process; improvement of process; implementation; and return to the required phase.

Key Words: supply chain, performance measurement, supply chain performance improvement

Topic Groups: production and operations management, business strategy

INTRODUCTION

Within the contemporary business environment, companies are forced to establish new forms of competitive relations. The survival and development of companies is even more dependent on their business partners. Every company is a participant of at least one supply

chain (SC), and every company "fights" to become a participant of a successful supply chain. The competition between the participants of the supply chain that was prevalent everything until recently now turned into a competition between the supply chains for end customers (e.g., Christopher, 1992; Mentzer et al., 2001). A new form of competition – a supply chain versus supply chain - led to the shift in focus, namely, the shift from management and improvement of individual performances of a company to management and improvement of the supply chain performances.

A necessary precondition for successfulness of management and improvement of the supply chain performances is performance measurement. Performance measurement is actually the assessment of the "health" condition of the SC through right measures, metrics, and indicators, while management and performance improvement implies the application of those measures, metrics and indicators in order to support the vision, mission, strategy, and objectives of the supply chain. Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of an action, according to Gunasekaran and Kobu (2007). SC performance measurement thus becomes one of the key factors of success of its participants. The aim of this paper is to give an answer to the main research question: "How to recognize and best use the opportunities for supply chain performance improvement?" In order to develop a conceptual model for supply chain performance management and improvement two types of desk research – literature review and theorizing has been conducted. These types of desk research are explained by Halldorsson and Arlbjorn (2005).

MODEL FOR SUPPLY CHAIN PERFORMANCE MANAGEMENT AND IMPROVEMENT

Model for supply chain performance management and improvement (MSCPMI) was developed for the needs of focal company and its key suppliers, suppliers' suppliers, customers, and customers' customers, so that they could accomplish competitive advantage through joint operations against other SCs on the market. Only the company that has "the largest (financial) power, the best know-how of products and processes, or has the greatest share of values created during order fulfilment", Stadtler and Kilger, (2005), p. 16, i.e. focal company, could launch an initiative for the application of this model. All other companies that do direct or indirect business with focal company are trying to become its key business partners. Also, all key SC members must accept the supply chain orientation (see Mentzer, 2001) and be willing to trust, commitment, interdependence, organizational compatibility, vision, mission, strategy and objectives of SC, and key SC processes. They must recognize "systemic, strategic implications of the tactical activities involved in managing the various flows in a supply chain" (Mentzer, 2001, p.11).

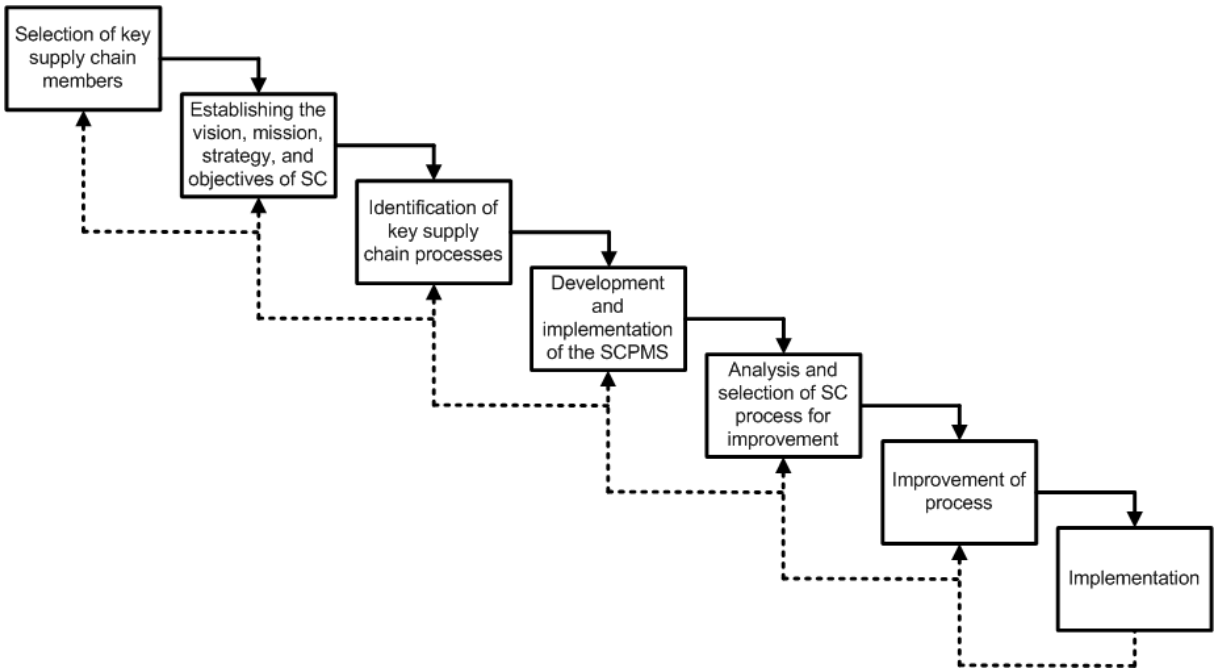
Model for supply chain performance management and improvement (figure 1) comprises the following phases:

1. Selection of key supply chain members;
2. Establishing the vision, mission, strategy, and objectives of supply chain;
3. Identification of key supply chain processes;
4. Development and implementation of the Supply Chain Performance Measurement System;
5. Analysis and selection of supply chain process for improvement;
6. Improvement of process;
7. Implementation; and
8. Return to the required phase of this model.

Selection of key supply chain members

During this phase, the focal company identifies the members of the supply chain including the end customers, and determines and conducts the procedure of the selection of key SC participants. Supply chain participants are as follows: focal company, its suppliers, suppliers' suppliers, direct customers, customers' customers, as well as end customers. The end customers represent individuals and companies that buy end products and/or services of the supply chains. It is important to identify the end customers since they provide money inflow for the SC by buying products and/or services. Focal company could perform a selection of key participants of the SC based on the analysis of links between SC participants. Four basic types of links between supply chain participants have been proposed (Lambert, 2005): managed process links, monitored process links, not-managed process links, and non-member process links. Managed process links are those links believed to be critical by the focal company, and therefore, the focal company wishes to integrate them and manage them. Monitored process links are the links for which focal company believes they should be adequately integrated and managed on behalf of other chain members, and thus wishes to monitore them. Not-managed process links are the links for which focal company believes they should be relinquished to other members of the SC to manage them. Non-member process links are the links for which the focal company believes they could affect its performances and also the performances of the SC. Focal company identifies key members of the SC based on identification of links that are of crucial importance for the success of the supply chain. One of the tools that could prove to be helpful while choosing the key SC members is the chart of the supply chain (see Lambert, 2005).

Figure 1: Model for supply chain performance management and improvement



Establishing the vision, mission, strategy, and objectives of supply chain

Key members of the supply chain should create a team that will be engaged in establishing the vision, mission, strategy, and objectives of supply chain. The vision of the supply chain refers to the position the SC wants to accomplish in the future. The mission of the supply

chain implies to the purpose of the existence of the SC, and refers to its long-term operating direction. The mission of the supply chain should also provide some answers on important questions such as: "Which products and/or services does the supply chain realize and why?", "For whom does the supply chain realize products and/or services?", and "How does the supply chain realize products and/or services?". The strategy of the supply chain refers to the attempts of the SC to use its own strengths and chances from the environment, and to eliminate its weaknesses as well as the threats coming from business environment. The strategy of the supply chain could be defined as a true combination of following components: operations strategy, outsourcing strategy, channel strategy, customer service strategy, and asset network (see Cohen and Roussel, 2005). Based on the strategy of the SC, the team deducts goals the SC wishes to accomplish. After that, the key supply chain members should harmonize their business visions, missions, strategies, and objectives with the vision, mission, strategy, and objectives of the supply chain.

We should probably stress that the terms vision and mission of the supply chain have been rarely used until now. Only two examples from the practice have been found so far for determining the vision of the supply chain, given by authors Gattorna and Tang (2003). Inversely, numerous authors dealt with strategic orientation and goals of the supply chain. Here we conclude that the business strategy and the goals of the SC are deducted based on the vision and mission of the SC, regardless of whether they are identified formally or informally.

Identification of key supply chain processes

Key members of the supply chain should create a team that will be engaged in the identification of key supply chain processes, i.e. processes that are of key importance for the existence of the supply chains. One of the forms of support could be recognized in key processes of the SC identified on behalf of Global Supply Chain Forum (GSCF) and Supply Chain Council (SCC) organizations. The Global Supply Chain Forum has identified the following key SC processes: customer relationship management, customer service management, demand management, order fulfillment, manufacturing flow management, supplier relationship managment, product development and commercialization, and returns management (see for example Lambert, 2005). While the Supply Chain Council proposed a division into five key processes: plan, source, make, deliver, and return (see e.g., Bolstorff and Rosenbaum, 2003). In addition, we must not neglect the fact that every supply chain is quite unique, and the abovementioned key processes of the SC could be taken only as a starting point while searching for the answer to the following question: „Which are the key processes within the supply chain?". Since these processes are best identified through flows (Stadtler and Kilger, 2005, p. 39), this stage needs to identify the flows of products, services, information, money, and knowledge. Flow of products and services refers to the movement of goods and services from the initial procurement of raw materials, through their transformation into final products and services, to delivery to end customers, and providing post-sales support, including returns and recycling. Flow of information refers to the exchange of information between SC participants. Flow of money refers to the movement of money between participants in the SC. Flow of knowledge refers to the sharing of knowledge between SC participants. In the end, the team should create a model of the supply chain process that will be connected with SCPMS in the following stage.

Development and implementation of the SCPMS

Key members of the supply chain should create a team that will be engaged in the development and implementation of the Supply Chain Performance Measurement System

(SCPMS). This team should then reach the decision on which of the developed concepts, models, tools (Balanced Scorecard (BSC), Economic Value Added (EVA), Logistics & Supply Chain Scoreboard (LSCS), Supply Chain Operations Reference model (SCOR), Global Supply Chain Forum (GSCF), Value Reference Model (VRM), and Hierarchy of Supply Chain Metrics (HSCM)) or some of their combination should adjust to the supply chain needs and implement them, or maybe to create a completely new solution.

SCPMS could be defined as a set of elements that is being used for quantification of effectiveness and efficiency of actions (Jovanovic, 2009). The effectiveness refers to the measure of accomplishing the defined goals of the supply chain as a whole (to do right things), while the efficiency refers to the measure of economic use of resources in the supply chain as a whole (to do things in the right way). Usually, the elements of SCPMS are: performance measures, metrics, and performance indicators.

Performance measure is the measure of object's property (e.g., products, services, processes, systems). Determining the performance measure include defining the object of observation, property of object, and the procedure of determining the measure of object's property. More precise determination of the performance measure could be given by means of metrics.

Metrics could be used for more precise determination of object's property. The development of metrics includes the designation of the object of observation, object's property, procedure of metrics determination (most often expressed in verbal and analytical form), necessary data sources based on which to determine metrics, the frequency of metrics calculation (e.g., daily, weekly, etc), benchmark metrics, and the executor (or executors) in charge of the process of metrics measurement and metrics comparison. The priority of metrics could be determined additionally, and the example of metrics determination could be given. According to Merriam-Webster Dictionary, metrics is defined as a „basis or standard of comparison" (Cohen and Roussel, 2005, p.186). In this way, it is implied that certain number or value becomes metrics only after it is compared to another appropriate number or value. Performance metrics may be defined as the „tools in the performance measurement process that take measurements, display results, and determine subsequent action", according to the Kenneth (1995), p. 64. Metrics are a powerful tool that allow for the follow-up of advancement, stagnation, or regression over time, and making management decisions accordingly. While determining the metrics of the SC, one has to respect the inter-functional process-oriented nature of the supply chain (Stadtler and Kilger, 2005). Therefore, the development of the SC metrics is not easy, but their measurement is even harder.

The performance indicator is the elementary pointer of the change in object condition (e.g., products, services, processes, systems). Indicators may be defined as pointers that »inform about relevant criteria in a clearly defined way«, based on Stadtler and Kilger (2005). Supply chain key performance indicator is a pointer of the change in object condition of the strategic importance for a supply chain.

Taking into account the suggestions of authors Cohen and Roussel (2005); Takle and Gabrielsen (2006) given in Fauske, et al. (2007); and Hieber (2002) given in Horvath and Moller (2004), herein are given the following recommendations for the development and design SCPMS:

1. System orientation. The SCPMS should be one integrated system. All the elements of SCPMS (e.g., performance measures, metrics, performance indicators) must be interrelated.

2. Network orientation. All key supply chain participants and links that exist between them must be identified prior to the development of SCPMS. The SCPMS should provide support for the business of all key SC participants.
3. Strategic orientation. SCPMS must follow a strategic orientation and goals of the SC.
4. Process orientation. The key supply chain processes must be identified prior to the development and design SCPMS. The SCPMS should indicate the results of key SC processes, not to summarize the results of individual participants in that SC.
5. Managing orientation. The SCPMS should provide support for managerial decision making. The SCPMS should be a simple tool, with the smaller number of elements, which give managers quick insight into the results and allow them SC performance management and improvement. This tool should enable supply chain managers to manage proactively.
6. Orientation to business partners. The SCPMS needs to be a useful tool for all supply chain participants. It should contribute to realize the benefits of establishing collaborative relationships by the key supply chain participants.
7. Balanced orientation. The SCPMS need to balance financial and non-financial performance measures.
8. Dynamic orientation. For every element of SCPMS appropriate dynamics of its monitoring must be established. The elements of SCPMS can be monitored continuously or in intervals (e.g., daily, weekly, monthly, etc).
9. Developmental orientation. It is necessary to ensure continuous consideration and development of SCPMS. Based on the assessment, the useful elements of SCPMS should be added and unnecessary removed.
10. Hierarchical orientation. The SCPMS should have a hierarchical structure. It is desirable to determine its elements on strategic, tactical, and operational level.

Different concepts, models, and tools are developed for the needs of supply chain performance measurement. Making a decision on which of these concepts, models, tools, or their combination should be applied or adjusted to the needs of certain SC, or perhaps one should develop an entirely new solution, is made harder by the fact that each and every supply chain is basically unique, and SCPMS must be separately developed and designed for each of them. Making this very important decision was supported by comparison of concepts, models, and tools developed so far, which allows supply chain performance measurement. The comparison of Balanced Scorecard (BSC) (see e.g., Kaplan and Norton, 1992; Brewer and Speh, 2000; Park et al., 2005), Economic Value Added (EVA) (see e.g., Stern Stewart & Co; Pohlen and Goldsby, 2003; Lambert, 2005; Presutti and Mawhinney, 2007), Logistics & Supply Chain Scoreboard (LSCS) (see e.g., Logistics Resources International, Inc; Frazelle, 2002) Supply Chain Operations Reference model (SCOR) (see e.g., Supply Chain Council; Bolstorff and Rosenbaum, 2003), Global Supply Chain Forum (GSCF) (see e.g., Lambert, 2005), Value Reference Model (VRM) (see Value Chain Group), and Hierarchy of Supply Chain Metrics (HSCM) (see AMR Research, 2004) is made on the basis of previously established recommendations for the development and design SCPMS (table 1).

When it comes to application of these concepts, models and tools for the supply chain performance measurement within the business environment, following conclusions may be drawn. The application of BSC concept on the supply chain performance measurement is still at the level of theoretical considerations (Brewer and Speh, 2000; Park et al., 2005). It is believed that the connection of BSC with EVA and Activity Based Costing (ABC) is possible in

practice. The independent use of EVA for the needs of the supply chain performance measurement is not enough, and therefore, it is necessary to consider putting EVA in the frames of a wider concept. LSCS was developed for the needs of company performance measurement, and it is now adapted for the supply chain performance measurement. A few company has applied LSCS. SCOR is a concept frequently applied for the needs of the supply chain performance measurement (see e.g., Bolstorff and Rosenbaum, 2003). The application of SCOR allows for quick lowering of costs and more efficient use of resources. In the upcoming years, the integration of independently developed referent models of the processes SCOR, Customer Chain Operations Reference model (CCOR), Design Chain Operations Reference model (DCOR), and Marketing Chain Operations Reference model (MCOR) is expected (Francis, 2005), which will allow for strategic orientation, process orientation, and business partners orientation to be completely supported. GSCF is also frequently applied concept within the business environment. In difference to the SCOR, the GSCF concept "is more strategic and focuses on increasing long-term shareholder value through closer cross-functional relationships with key members of supply chain«, according to the Lambert (2005), p. 221. VRM is better conceived than SCOR, but the number of companies that applied this concept so far is lower than the number of companies that applied SCOR. There were no data found in available literature in relation to practical application of HSCM model.

Table 1: The comparison of concepts, models, and tools which allows supply chain performance measurement

Requirement	BSC	EVA	LSCS	SCOR	GSCF	VRM	HSCM
System orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Network orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Strategic orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Process orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Managing orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Or. to business partners	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Balanced orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Dynamic orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Developmental orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Hierarchical orientation	⊕	⊕	⊕	⊕	⊕	⊕	⊕

⊕	- fully supported
⊕	- largely supported
⊕	- partially supported
⊕	- slightly supported
⊕	- not identified

Analysis and selection of supply chain process for improvement

Key participants of the SC have to authorize a team that will be engaged in the analysis of the present state within the supply chain, and identifying the location at which to accomplish additional values. In this stage, team members that were previously engaged in identifying key processes within the SC are now hired again. The goal of this team is to determine criteria for the selection of the supply chain for development, and to select a process that is most likely to contribute to the accomplishment of additional values for the total SC.

Improvement of process

A team previously authorized on behalf of key members of the supply chain is now supposed to find the best solutions for developing the previously selected process, and composes a formal plan of conducting these developments. Therefore, it is necessary to consider the introduction and development of the forms of cooperation between key participants of the supply chain. The SCM concepts that allow the improvement of business relations between the participants in the supply chain are: Quick Response (QR) (see e.g., McMichael et al., 2000; Perry and Sohal, 2000; Hayes and Jones, 2006), Vendor Managed Inventory (VMI) (see e.g., Simchi-Levi et al., 2000; Pohlen and Goldsby, 2003; Jespersen and Skjott-Larsen, 2006; Elvander et al., 2007), Supplier Managed Inventory (SMI) (see e.g., Pohlen and Goldsby, 2003), Continuous Replenishment (CRP) (see e.g., Clark and Lee, 2000), Efficient Consumer Response (ECR) (see e.g., Harris et al., 1999; Kotzab, 1999; Hoffman and Mehra, 2000; Seifert, 2003; Reyes and Bhutta, 2005), Collaborative Planning, Forecasting and Replenishment (CPFR) (see e.g., Seifert, 2003; Ireland and Crum, 2005; Jovanovic, 2008), and Flowcasting (see Martin et al., 2006).

Simchi-Levi, et al. (2000) have performed the comparison of QR, CRP, advanced CRP, and VMI concepts based on responsibility for decision making with regard to generating orders, ownership over inventories, and new skills that are necessary for vendors. In 2003, Tyana, J. and Wee, H-M. gave a recommendation for the selection of SCM concept depending on the structure of power in relations between retailers and suppliers.

QR, VMI, SMI, CRP, ECR, CPFR, and Flowcasting concepts were presented on behalf of Jovanovic (2009).The comparison of these concepts (table 2 and table 3) is done according to the application; the form of relationship between supply chain participants; the financial results of business operations of the supply chain participants; the process of decision-making; the process of meeting the needs of the end customers; the results of communication within the supply chain, the possibilities of occurrence of the bullwhip effect and risks.

Table 2: The comparison of SCM concepts (part 1)

Characteristic / Concept	Application	Form of relationship between SC participants	Financial results of business operations of the SC participants	Process of decision-making
QR	Textile and clothing industry	Coordination	Profit for the manufacturer and retailer	Cooperation between manufacturer and retailer
VMI	In many industrial and service sectors	Coordination	Profit for the manufacturer and retailer	Cooperation between manufacturer and retailer

SMI	In many industrial and service sectors	Coordination	Profit for the supplier and manufacturer	Cooperation between supplier and manufacturer
CRP	In many industrial sectors	Cooperation	Profit for the manufacturer and retailer	Cooperation between manufacturer and retailer
ECR	Commerce	Cooperation	Profit for the manufacturer and retailer (wholesaler)	Cooperation between manufacturer and retailer (wholesaler)
CPFR	In many industrial and service sectors	Collaboration	Profit for all participants of SC involved in the CPFR	Cooperation between two or more participants in SC
Flowcasting	Commerce	Collaboration	Profit for all participants of SC involved in the Flowcasting	Cooperation of all the primary participants in the SC

We could note that the application of SCM concepts requires positive intensification of relations between the participants of the supply chain on a long-run. The "competition", as a traditional form of business strategy between the participants of the SC is being surpassed by new forms of cooperation within the SC – coordination, cooperation, and collaboration. The negotiations held with the goal of increasing own profit on the one hand, and increasing the loss of a business partner on the other hand, are being replaced with joint processes of decision-making, so that all business partners could achieve profit. The process of meeting the needs of an end customer doesn't stop being a key process only for the intermediate predecessor to the end customer within the SC, but it also refers to all participants of the supply chain. There's a need for right information, in right time, at the right place between the participants of the SC. Frequent possibilities of occurrence of the bullwhip effect are supposed to be eliminated, and risks are to be shared between the participants of the SC.

Table 3: The comparison of SCM concepts (part 2)

Characteristic / Concept	Process of meeting the needs of the end customers	Results of communication within the SC	Possibilities of occurrence of the bullwhip effect	Risk
QR	Key process for the manufacturer and retailer	Right information, at the right time, at the right place between the manufacturer and retailer	Minimal	Shared risk between manufacturer and retailer
VMI	Key process for the manufacturer and retailer	Right information, at the right time, at the right place between the manufacturer and retailer	Minimal	Shared risk between manufacturer and retailer

SMI	Key process for the manufacturer	Right information, at the right time, at the right place between the manu-facturer and its supplier	Major	Shared risk between manufacturer and its supplier
CRP	Key process for the manufacturer and retailer	Right information, at the right time, at the right place between the manufacturer and retailer	Minimal	Shared risk between manufacturer and retailer
ECR	Key process for the manufacturer and retailer (wholesaler)	Right information, at the right time, at the right place between the manufacturer and retailer (wholesaler)	Minimal	Shared risk between manufacturer and retailer (wholesaler)
CPFR	Key process for all participants of SC involved into CPFR	Right information, at the right time, at the right place between all participants of SC involved into CPFR	Minimal/Eliminated - depending on the participants involved in the CPFR	Shared risk between participants of SC involved into CPFR
Flowcasting	Key process for all primary participants in the SC	Right information, at the right time, at the right place between all primary participants in the SC	Eliminated	Shared risk between primary participants in the SC

Implementation

In this phase, the team authorized by the key members in the supply chain, implements the planned improvement of process and monitors the results achieved by this change. The monitoring over all processes of the supply chain is provided, as well as the response in cases of unplanned deviations.

Return to the required phase of this model

This indicates a return to a previous phase of this model.

DISCUSSION

Informal supply chains exist in many countries, especially in developing countries (Reyes and Bhutta, 2005), where great number of companies is still trying to establish internal integration of processes and then to focus on external integration (Waters, 2007). Companies come to a conclusion that they can't respond to changes within the contemporary business environment as independent entities, and they become aware of the importance of

establishing and developing better business relations with the exchange partners. Every company has participated in at least one supply chain, whether formal or informal, and every company strives to become participant of successful SC. Everything until recently, the competition between participants in the SCs was predominant, but now it evolves into the competition between the supply chains for customers. The survival and success of participants in the supply chain will be guaranteed in the environment everything until the supply chain manages to satisfy the customers by right products and/or services according to the right conditions, to the right place, and at the right time. Therefore, participants of the supply chain are trying to recognize and utilize opportunities of supply chain performance improvement.

Numerous researchers have been engaged in the supply chain performance measurement. Most number of them pointed out to the fact that the supply chain performance measurement is actually in the function of management and development of the supply chains. For example, Horvath and Moeller (2004) stressed that SCPMS is the central part of the supply chain control system. According to them, the basic function of SCPMS is not the supply chain performance measurement, but giving support to management and improvement the supply chain performances. However, in spite of this, the development of the comprehensive model for supply chain performance management and improvement, in which SCPMS would be included in, didn't get enough attention in the relevant literature. The exception is the attempt of Marien (2000) which showed nine-step supply chain management process improvement model developed by University of Wisconsin in conjunction with industry practioners. In spite of the fact that this model hasn't been represented in details, the development of the tools for supply chain performance measurement could be anticipated within its frames. This paper suggests a conceptual model for supply chain performance management and improvement (MSCPMI) for supporting SC members in efforts to achieve competitive advantage over other supply chains. This model may be viewed as a guide that allows the key SC members to improve SC performance and achieve better business results in the market. Initiative for the implementation of this model can take focal company. All the others companies that directly or indirectly doing business with the focal company can struggle to become its key business partners.

Four specific contributions were accomplished during the engagement in the development of MSCPMI. First, the differentiation between the terms "performance measure", "metric", and "performance indicator" in business context is carried out. Second, a set of the ten recommendations for the development and design SCPMS (system orientation, network orientation, strategic orientation, process orientation, managing orientation, orientation to business partners, balanced orientation, dynamic orientation, hierarchical orientation, and developmental orientation) is determined. Third, the comparison concepts, models, and tools which allows supply chain performance measurement (BSC, EVA, LSCS, SCOR, GSCF, VRM, and HSCM) is made according to the established recommendations for the development and design SCPMS. Fourth, the comparison of SCM concepts (QR, VMI, SMI, CRP, ECR, CPFR, and Flowcasting) is done according to the application, the form of relationship between supply chain participants, the financial results of business operations of the supply chain participants, the process of decision-making; the process of meeting the needs of the end customers, the results of communication within the supply chain, the possibilities of occurrence of the bullwhip effect and risks.

There are some limitations that need to be addressed regarding the present study. First, the differentiation between the terms "performance measure", "metric", and "performance indicator" is not extensive enough. Definitely, these terms are not synonyms and they have different meanings. In future studies the meanings of these terms from other fields (e.g.,

mathematical science) should be surveyed, and after that linked and applied with a business context. Second, only one way is suggested for a selection of key supply chain members based on Lambert, 2005. Further development of useful tools for a selection of key SC members is needed. Then, in the third phase of the MSCPMI it is supposed a creation of model of the SC process. In addition, no tools were recommended for use. Thus, suitability of some tools for modelling SC processes (e.g. ARIS) needs further discussion. Fourth, the model MSCPMI is primarily the result of theoretical considerations and is not applied and evaluated in practice. Such practical research work would require, among other things, a lot of time and money.

CONCLUSION

Changes within the modern business environment have made SCM getting to the center of attention of both the business and academic community. These changes refer to the shift from local and national to global focus, from stable to unstable markets, from the competition between the supply chain member companies to the competition between the supply chain for winning end customers of products and/or services, from management and improvement of individual performances of a company to management and improvement of the supply chain performances, etc. The research for new forms of establishing, maintaining, and improving of business relations between the supply chain member companies becomes even more actual.

This paper suggests a conceptual model for supply chain performance management and improvement (MSCPMI) for supporting supply chain members in efforts to achieve competitive advantage over other supply chains. This model may be viewed as a guide that allows the key SC members to improve supply chain performance and achieve better business results in the market. The proposed MSCPMI comprises the following phases: selection of key SC members; establishing the vision, mission, strategy, and objectives of supply chain; identification of key SC processes; development and implementation of the Supply Chain Performance Measurement System (SCPMS); analysis and selection of SC process; improvement of process; implementation; and return to the required phase. Initiative for the implementation of this model can take focal company. Also, in order to create conditions for the application of the MSCPMI it is necessary that all key SC members accept the supply chain orientation (see Mentzer, 2001). Key SC members must be willing to trust, commitment, interdependence, organizational compatibility, vision, mission, strategy, and objectives of SC, and key SC processes. The specific contributions of this paper are related with differentiation of terms "performance measure", "metric", and "performance indicator" in a business context, determination of a set of recommendations for the development and design Supply Chain Performance Measurement System (SCPMS), comparison of concepts, models, and tools developed so far, which allows supply chain performance measurement, as well as comparison of SCM concepts. The future directions of this research should be focused on development of suitable tools for a selection of key SC members, consideration of the possibility of using some tools for modelling SC processes, cost-benefit analysis of the application of the concepts, models, and tools which allows SC performance measurement, as well as practical application of the developed model for supply chain performance management and improvement.

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