

Role and Importance of Business Processes in the implementation of SCM Information Systems

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Abstract

In recent years Supply Chain Management information systems (SCM IS), have raised growing interest among researchers from several knowledge areas, such as Information Systems, Artificial Intelligence, Simulation, Telecommunications, Economics and Business Management. Among all new information technologies, SCM IS are considered as a powerful tool to enable integration between inter-organisational processes and therefore create macro process that increase the revenues of every member in the supply chain.

Despite the claimed benefits that provides the implementation of a SCM IS, implementation and use is a hazardous and problematic process, there well-documented studies that show how an inadequate implementation can cause big loss to companies. Nowadays there is no existed a standard process that assure the success of the implemented SCM IS. In this paper, we analyze the problematic and use Business Process approach as a key enables to improve the implementations of SCM IS.

1. Introduction

In current business environments it is common practice that organizations use new coordination and alignment models in order to improve their individual and group logistic and production processes, increase overall business competitiveness, and to try to get a bigger and better share of the market while at the same time try to deliver greater value to customers.

Today, one of the most used of these models results from a Supply Chain Management

perspective, in which organizations create a society of autonomic entities in order to work together with the coordination and alignment of their logistics and production value chains and the associated information systems ([1]Chandra et al 2001). Many industries, such as, textile, automotive, pharmaceutical, have needed for years the integration and standardization provided by this kind of information systems, due to the complexity of their productive processes, the amount of involved customers, the required variety of raw materials and the dissemination around the world of their business partners.

In recent years the interest for ES and specifically for SCM systems has grown considerably not only in the enterprise, but also in academic research as revealed by the number of publications increased recently (Gunasekaran and Ngai 2004) and the space offered for this area in conferences around the world. As a representation of these efforts we can mention the creation a council, that gathering best practices of their members has presented Supply-Chain Operation Reference-model (SCOR), a publicized reference framework that has allowed a better understanding of SCM processes and that can be used to define and capture all of the chain processes and measure their performance. In fact, most of the SCM tools have been designed in line with the SCOR, as a way to promote the standardization in inter-organizational logistics and production processes.

Despite this growing interest in SCM, there is a long path to fulfil all their theory promises and

automate their process through the implementation and use of information systems and technologies.

We believe that the use of Business Process principles and their related areas, such as, business process modelling, business process reengineering, business process management and characteristics of BPM can also help to improve and manage the SCM IS implementation.

This paper is organized as follows, in section 2; we present a definition and importance of SCM IS and their implementation problem. In section 3, we present a brief description of BP and related areas and how they can be used in SCM IS implementation. Finally, in section 4, we present conclusion and further research opportunities.

2. SCM IS and its implementation

2.1. SCM

Supply Chain Management (SCM) has emerged as a best practice in order to improve business processes and develop customers, supplier and third party partners' relationships. The definition of SCM has been analyzed from very different perspectives; Tan (2001) define it from buy-sales perspective, stating that SCM is a set of decisions or activities of buy and supply raw material. Thomas and Griffin (1996) who defines SCM as the management of materials, products and information that flows from the raw material supplier, to final client, present other perspective.

Frohlich and Westbrook (2001) present a definition that can be used to analyze SCM with regards to business process. They defines SCM as a set of activities used by the organisations for integrate all their business processes and operations, including suppliers, partners, and customers into mega processes. These activities may include the use of information systems (IS), communications technologies (as EDI) and chain knowledge web.

In this last definition, we can appreciate two elements that needs be remarked, the role of the IS as a fundamental element for SCM developing;

and the perspective of business process as one of the most complete and accepted definition of SCM.

2.2. SCM Information Systems

In order to work under a complete SCM scheme and automate all their business processes along whole supply chain, it is necessary share information between partners, as well as, collaboration of many systems, providers and customers. In other words, a SCM system is made of many software components, some of them being legacy systems but most new components based on implemented custom-off-the-shelf software, all of them requiring inter- and intra-organizational integration (Themistocleous and Irani 2001).

From a IS/IT perspective, we can define SCM IS as a group of information systems that, working together in an inter-organizational environment, supports business partners to carry out their operations and decision making in those logistic and production processes relative to planning, sourcing, and making, delivering and returning of products (Caldelas and Pastor 2006). This definition is the best suited for this paper.

2.3. SMC IS Implementation problems

Despite the growing attention from practitioners, software vendors and consultants there is many topics that needs to be adressed to increase the effectiveness of SCM IS. Special attention should be paid to implementation issues, where the lack of standards approaches for alignment and deployment process are causing troubles in organisations, (Sridharan et al 2005, Caldelas and Pastor 2007).

According with practitioners (Srinvas 2002), there is a lack of a standard implementation approach to manage SCM IS implementation olution. Some of the reasons stated by Srinvas are:

- Poor coordination between master data between processes

- SCM tools taking long runtimes for typical demand and supply plans.
- Lack of stability in the IS
- IT and Managers are not well trained and coordinated to tap all potential if the IS.

Despite that there is no exist one solution for manage whole implementation process, and overcome the problems many researches (Al-Mashari y Zairi 2000, Larkind y Luce 2000, Boon et al 2004, Shiradan 2005 Power 2005) have propose some factors that require special attention to improve a implementation process, such as:

- Define clear goals and scope.
- Consistent and pre-emptive communication.
- A well-defined and managed programme baseline.
- A succession of manageable delivery milestones to assure quality in the process.
- Start the implementation carefully and a business process at time.
- Educate staff and participants of the SCM initiative.
- Align business process with IS/IT solutions designs.
- Use Change Management techniques and tools.

Besides previous recommendations, in a recent study (Caldelas and Pastor, 2006b) presented a description of the main SCM IS problems organized in a life-cycle framework, they stated that the main implementations problems of SCM IS implementation are:

- Increase the trust, commitment in the relationship between members of a SC initiative.
- Explore and exploit others benefits of Supply Chain Operation Reference (SCOR) framework, such as, a tool for business process reengineering and business process management, define a set of desired characteristics to choice the better suited COTS packages, training personnel, among others.

- Define and use a set of best practices in SCM IS Implementation to determinate a set of CSF.
- Use Change Management as impeller of SCM IS implementation, and help each other in integral implementation process.
- Develop of procedures and metrics to evaluate SCM IS Value, especially at intra organizational level.
- Define a standard method that merging business process and IT process help to an organization or a set of them, to implement a SC initiative and IT/IS (SCM IS) required, with the maximum benefits and a full-integration, in a short period of time and with high rates of Return of Investment..

The use of BPM and SCOR model can be helpful to improve SCM IS.

3. Business Process and SCM

3.1. Business Process

A business process is a set of linked activities that create value by transforming an input into a more valuable output. Both input and output can be artefacts and/or information and the transformation can be performed by human actors, machines, or both.

There are three types of business processes:

- Management processes that are related to strategic decisions, and usually coordination of efforts of whole organisation.
- Operational processes. Are theses process that “add-value” to the products, such as, production process.
- Supporting processes – these processes not add value directly to a product or services but are important for support whole process, such as client management, post-sale services, IT and human resources services.

According with Koch (2001) there are three different features of SCM IS that clearly match with BP principles:

- The cross functional scope of ES along with communications technologies enables the creation of business networks.
- The configurability of ES modules and sub-modules can be used to support the business process modelled.
- The integrativeness of ES systems of have a big and common database repository, the control of all resources enable a BP reengineering.

3.2. SCOR framework

The SCOR reference model was created in 1997 by a coalition of a significant number of organizations and practitioners in logistics. They founded the Supply Chain Council to analyse the SCM phenomenon from a global and inter-organizational viewpoint. Their goal was to provide a conceptual tool to increase effectiveness in supply chains operations and a common communication language for business partners in their trading relationships. The first step was the task of define the SCM term and the processes used to connect customers, suppliers and partners into an inter-organizational environment (Stephens 2001).

The SCOR model takes traditional business processes and applies them within an inter-organizational environment to describe all the interactions occurring in a logistic or production value chain, from the generation of an order request to the return of excess and damage products (Lockamy III and McCormack 2004).

The Supply Chain Council defines five different management processes in order to manage global logistic and production processes (Figure. 1):

- *Plan*. - This process is in charge of planning for the balance between supply and demand requirements in order to optimize the logistic and production resources with regard to requirements. It also includes the spreading of the plans to all chain members to coordinate and update the other processes.
- *Source*- This process is in charge of evaluating and selecting providers according

to the established criteria and authorizes future payments to them. In the same way, it contains the programming of the periodic delivery of raw material in order to keep optimal stock levels.

- *Make*. - This process is used to schedule the logistic and production activities, including design and product tests, as well as packing and production rules.
- *Deliver*. - In this process the means and transport routes are selected, the warehouses are managed as well as the required activities for merchandising, installing and following customer satisfaction.
- *Return*. - This process contains the management activities regarding the return of exceeding or defective raw material, verification of its status, return schedule or repair.

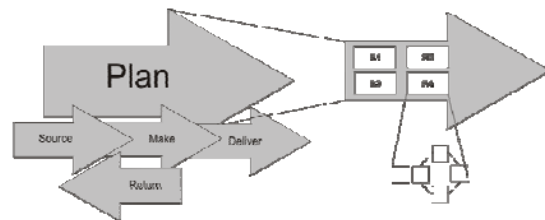


Figure 1. Management processes of SCOR mode (SCOR 2005)

All of these management processes are defined and decomposed into three levels of detail as. At Level one (plan, source, make, deliver and return), supply chain performance can be directly tied to the business objectives of the organisation. Levels two and three process elements are used to describe more and more detailed activities to provide greater insight into operations of the supply chain. There is a level four where companies implement specific SCM practices in order to adapt to changing business conditions but it is out of the scope of SCOR (SCOR 2005).

As far as we can appreciate, the three kind of process of business process are presented in SCM framework

BP	SCOR Framework
Management	Plan, and Source
Operational	Make
Support	Not deal directly, but gives some directives about their design.

3.3. Business Process Management

In the latest years, there have been various definitions of what can be understood as Business Process Management (BPM). This concept was first discussed in the second half of the last decade, when the business area was looking for models to achieve excellence in its processes. In those years, there were many authors that offered their point of view about BPM, mainly to explain the situation at that time by defining BPM as an approach that “presents a more comprehensive array of improvement options” and can help organisations “avoid the tendency to fall prey to the hype of a new management fad” (DeToro and McCabe, 1997). In addition, Armistead *et al.* (1997) cited the drivers for adopting BPM to be the market globalisation, changing technology, regulation, stakeholders actions and the eroding of business boundaries.

Similarly, Elzinga *et al.* (1995) defined that BPM as “a systematic, structured approach to analyse, improve, control, and manage processes with the aim of improving the quality of products and services”. Zairi (1997) describes BPM as “a structured approach to analyse and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company’s operations”. DeToro and McCabe (1997) suggested that by using BPM the organization could be viewed as a series of functional processes linked across it.

Nowadays, BPM is considered as “a customer-focused approach to the systematic management, measurement and improvement of all company processes through cross-functional teamwork and

employee empowerment”. According to Zairi (1997), BPM should be addressed by a set of rules that include issues such as activities mapping, customer focus with linkages between key activities, relying on documented procedures and measured activities, inspiration in best practices and the role as an approach for culture change. In the same way, DeToro and McCabe (1997) state that BPM solves many of the problems of the traditional hierarchical structure because it focuses on the customer, manages the main processes between functions and improves them.

To SCM IS implementation, Business Process Management (BPM) includes methods, techniques, and tools to support the design, management, and analysis of supply chain business processes involving humans, organizations, applications, documents and other sources of information. The conduction of BPM should include the identification of the main processes and its documentation, in order to select the improvement strategy and the possible implemented changes to the processes. This change have to be reflected in the way that organisation face SCM IS implementation process.

BPM and SCM are generally treated as two different fields without no relationship between them (McAdam and McCormack, 2001). It is usually that BP techniques are usually applied to a single organisation, while SCM to multi organisational environment.

One of the most important principles of BPM defined by Hammer and Champy (1993) is the belief that workers should be more power and information to improve the business process. In SCM, the participation of whole organisation at every level is an enabler useful to create relationship and trust along the chain members. In order to success in the implementation of a SCM IS it is recommended the creation of multidisciplinary work groups integrated by workers, business managers, IT managers and consultants. With this variety of multidisciplinary knowledge help to comprise and holistic view of the business and thus, manage a better SCM IS implementation process.

Other important advantage in BPM is that roles definition, as we stated before, implementing business process management (BPM) within your organization will require new job roles and possibly even a new organizational structure. This change can be used in order to also the roles to implementations process of SCM IS.

3.4. Business Process Modelling

The modelling or design of Supply Chain process takes a lot of manpower, time and money. The use of reference models is a common practice between product vendors to guide the business design. Despite that the use of SCOR or others reference models are based on best practices and can model any supply chain process, the real world implementation adopt a trade-off approach, balancing, the reference model and the current business process. This coordination ends up with a customization of the framework to the “as-is” business process.

Focused the business process design through a business process perspective can be useful to accomplish a well-balanced and customized final “to-be” process that is the first step in a SCM IS implementation.

Modelling the internal business process and the inter-organisational business process is a difficult task that require collaboration of all organizations, according to Kobayashi et al (2002) and Venkatraman (2000), the use a top-down BP modelling perspective, beginning with the inter-organisational level as main business process template and after the intra-organisational level as their sub-processes. By using the main process as a business template, it can be reused to guide the implementation of the SCM IS I each of the business unit that participate in the supply chain.

Another importance issues related to implementation of SCM IS and BP modelling is referred to scenario creation; with the supporting of these tools it is possible to create possible implementation scenarios that can enable to choose the more accurate business process and determine which implementation approach can be used to face whole process.

3.5. Business Process Reengineering

The implementations of ES and especially SCM IS bring big changes in current process and activities. It is recommended to reengineer business process at the same time to implement SCM IS. Performances in parallel both process can save cost, and enable synergy that improve the internal process of each member of the supply chain (Al-Mashari and Zairi, 2000).

Due to that most of the problems in SCM and SCM IS are not related to technological problems but to logistical and alignment between IT/IS and the business process. Custom a solution package is a difficult task that can cause problems in the implementation process (Sridarhan 2004). In order to manage the implementation process, it is recommended redesign business process to accommodate SCM package modules with in business operation. Besides, to make the implementation process easier, also provide the advantage of that most of the SCM packages vendors are aligned with SCOR model.

3.6. Business Process Integration

As many authors have stated (Themistocleous et al, Caldelas et al), the Enterprise Application Integration (EAI) technologies, can enabled the integration of SCM IS and therefore, SCM IS team have to pay special attention to the use of EAI technologies. The use of Workflow-based EAI can be a good approach to deal with integration issues related to BP and IT. The generation of integration adapter through the use of BPI and EAI in SCM IS implementation can reduce manpower and time resources in significantly almost in a 30% (Kobayashi 2002).

4. Conclusions

In the present work, we have presented and analyzed some of the characteristics of SCM, SCM IS and Business Process related areas. Today, the implementation process of a SCM information system is a hard work task that require a lot of manpower and financial resources and a lot of time. Even the spend of lot of resources not guarantee a success implementation and obtain all the promised benefits.

We have shown that the use of business process approach and their related areas can be helpfully to manage some issues related to implementation of SCM IS. BP Management, BP Reengineering and BP Modelling allow to organisations create work groups; reduce risk management and a better comprehension between business and IT/IS. All this advantages are the first steps to improve implementation process, thus comprise all the potential benefits in each site of the supply chain

As far as we can see, Business Process approach, along with SCM IS nature specific and have direct relationship with SCM implementation factors previously presented.

Some of problems presented in section 2 can be face trough the use of Business process scope, such as:

- *Exploit SCOR for others application.* SCOR model, by itself is defined by terms of business process, but we can use it to define many specification, such as, all sub-systems that are required to implement. Due to the nature of SCOR (create by details levels), it can be uses to define different models like the Computed Independent Model at level 1, Platform Independent Model at level 2 , and also can give us some guides trough level 3 to define a Platform Specific Model.
- *Business Process as Change factor.* Both SCM and BP, require big changes in the organisation, the use as BP reengineering can enable a better implementation process and help managers to create new work strategies, the actual process design activity, and the implementation of the complex technological, and help in human, and organizational dimensions.
- *Implementation approach.* Business Process approach trough SCOR framework can be used by services organisations to analyze, design and improve Supply Chain initiatives and a roadmap to implement SCM IS.

There is a long path to follow for obtain a well-defined and completed process to implement in short time and exploding all capabilities that a SCM information system can offer to companies.

It is important to continue look up others knowledge areas, such as, software engineering and development, Software Architectures platform (SOA), or business process, to acquire components than can be reused in SCM IS implementation process.

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