# Towards Improving Supply Chain Coordination through Business Process Reengineering

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## 1. Introduction

Global marketplaces, higher levels of product variety, shorter product life cycles, and demand for premium customer services are all things which cause pressure for one supply chain to be more efficient, more time compressed and more cost effective. This has become even more critical in recent years because the advancement in information technology has enabled companies to improve their supply chain strategies and explore new models for management of supply chain activity. Among others, important research area in the supply chain management literature is the coordination of the supply chain. Actually, the understanding and practicing of supply chain coordination has become an essential prerequisite for staying competitive in the global race and for enhancing profitability. Hence, supply chain management needs to be defined to explicitly recognise the strategic nature of coordination and information sharing between trading partners and to explain the dual purpose of supply chain management: to improve the performance of an individual organisation an to improve the performance of the whole supply chain. In this context, we present the business process reengineering as a tool for achievinging effective supply chain management, and illustrate through a case study how business process modelling can help in achieving successful improvements in sharing information and the coordination of supply chain processes.

It is well recognised that advances in information technologies have driven much change through supply chain and logistics management services. Traditionally, the management of information has been somewhat neglected. The method of information transferring carried out by memebers of the supply chain has consisted of placing orders with the member directly above them. This caused many problems in the supply chain including: excessive inventory holding, longer lead times and reduced service levels in addition to increased demand variability or the 'Bullwhip Effect'. Thus, as supply chain management progresses, supply chain managers are realising the need to utilise improved information sharing throughout the supply chain in order to have coordinated supply chain and to remain competitive. However, coordination is not just a mere information sharing. Information can be shared but there may not be any alignment in terms of incentives, objectives and decisions (Lee et al., 1997b). Coordination involves alignments of decisions, objectives and incentives and this can be done only through new reengineered business process models, which need to follow the information sharing. Appropriate business processes are a prerequisite for the strategic utilisation of information sharing, because the simple use of information technology applications to improve information transfers between supply chain members is not in itself enough to realise the benefits of information sharing. A mere increase in information transfers does not mean that information distortions (Bullwhip Effect) will be avoided and the efficiency of logistics processes will be improved. The business models of existing processes have to be changed so as to facilitate the better use of the information transferred (Trkman et al., 2007). In this chapter, by using business process modelling and simulation we show how achieving only successful business process changes can contribute to the full utilisation of improved information sharing, and so to the full coordination of the supply chain. In accordance with the above, the main goals of this chapter are:

- To develop strategic connection between information sharing and supply chain coordination through business process reengineering;
- To present how only full coordinated supply chains can increase supply chain performances as costs and value of Bullwhip Effect;
- To promote value of Bullwhip Effect as a universal performance for supply chain coordination;
- To connect existing theoretical studies with a real-life complex case study, in an attempt to provide people in the working world with the expected performance improvements discussed in this chapter.

In order to achieve these goals, this chapter analyse a two-level supply chain with a single supplier who supplies products to a retailer who, in turn, faces demands from the end customer. In addition, a discrete events simulation model of the presented supply chain has been developed.

The organisation of the rest of this chapter is as follows: The next two sections briefly review related literature about the key concepts of the chosen topic. Section 4 formulates the case study and outlines business process models for the current and proposed state for the company under consideration. Section 5 details a simulation study with experimentation concerning information sharing, business process models and a type of inventory control, while Section 6 discusses the results and concludes.

## 2. Supply chain coordination

### 2.1 Background

A supply chain is the set of business processes and resources that transforms a product from raw materials into finished goods and delivers those goods into the hands of the customer. Supply chain management has been defined as 'the management of upstream and downstream relationship with suppliers, distributors and customers to achieve greater customer value-added at less total cost' (Wilding, 2003). The objective of supply chain management is to provide a high velocity flow of high quality, relevant information that enables suppliers to provide for the uninterrupted and precisely timed flow of materials to customers. Supply chain excellence requires standardised business processes supported by a comprehensive data foundation, advanced information technology support and highly capable personnel. It needs to ensure that all supply chain practitioners' actions are directed at extracting maximum value. According to (Simchi-Levi et al., 2003), supply chain management represents the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods, and related information from the point of origin to the point of consumption for the purpose of meeting customers' requirements. The concept of supply chain management has received increasing attention from academicians, consultants and business managers alike (Tan et al., 2002; Feldmann et al., 2003; Croom et al., 2000; Maslaric, 2008). Many organisations have begun to recognise that supply chain management is the key to building sustainable competitive edge for their products and/or services in an increasingly crowded marketplace (Jones, 1998). However, effective supply chain management requires the execution of a precise set of actions. Unfortunately, those actions are not always in the best interest of the members in the supply chain, i.e. the supply chain members are primarily concerned with optimising their own objectives, and that self serving focus often results in poor performance. Hence, optimal performance and efficient supply chain management can be achieved if the members of supply chain are coordinated such that each member's objective becomes aligned with the supply chain's objective.

According to (Merriam-Webster, 2003), coordination is a process to bring into a common action, movement or condition, or to act together in a smooth concerted way. Coordination is studied in many fields: computer science, organisation theory, management science, operations research, economics, linguistic, psychology, etc. In all of those fields, 'coordination' deal with similar problems and some of that knowledge might be utilised in the research of supply chain coordination. Coordination issues in supply chain are discussed in the literature in various ways including supply chain coordination (Lee et al., 1997a), channel integration (Towill et al., 2002), strategic alliance and collaboration (Bowersox, 1990; Kanter, 1994), information sharing and supply chain coordination (Lee et al., 1997a; Lee et al., 1997b; Chen et al., 2000), collaborative planning, forecast and replenishment (Holmstrom et al., 2002), and vendor-managed inventory (Waller et al., 1999). In general, supply chain coordination can be accomplished through centralisation of information and/or decision-making, information sharing and incentive alignments. Various analyses on different coordination mechanisms have been carried out to develop optimal solutions for coordinating supply chain system decisions and objectives. Most literature addresses coordination problems in the following three situations (Sahin & Robinson, 2002): (1) decentralised or centralised decision-making; (2) full, partial, or no information sharing; (3) coordination or no coordination. For the purpose of the present chapter, we will review situations belonging to the second category, information sharing.

### 2.2 Information sharing

Coordination between the different companies is vital for success of the global optimisation of the supply chain, and it is only possible if supply chain partners share their information. In traditional supply chains, members of the chain make their own decision based on their demand forecast and their cost structure. So, many supply chain related problems such as Bullwhip Effect can be attributed to a lack of information sharing among various members in the supply chain. Sharing information has been recognised as an effective approach to reducing demand distortion and improving supply chain performance (Lee et al., 1997a). Accordingly, the primary benefit of sharing demand and inventory information is a reduction in the Bullwhip Effect and, hence, a reduction in inventory holding and shortage costs within supply chain. The value of information sharing within a supply chain has been extensively analysed by researches. Various studies have used a simulation to evaluate the value of information sharing in the supply chains (Towill et al., 1992; Bourland et al., 1996; Chen, 1998; Gavirneni et al., 1999; Dejonckheere et al., 2004; Ferguson & Ketzenberg, 2006). Detailed information about the amount and type of information sharing can be found in (Li et al., 2005).

The existing literature has investigated the value of information sharing as a consequence of implementing modern information technology. However, the formation of a business model and utilisation of information is also crucial. Information should be readily available to all companies in supply chains and the business processes should be structured so as to allow the full use of this information (Trkman et al., 2007). One of the objectives of this chapter is to offer insights into how the value of information sharing within a two-level supply chain is affected when two different models of business process reengineering are applied. Moreover, the literature shows that, although numerous studies have been carried out to determine the value of information sharing, little has been published on real systems. The results in this chapter have been obtained through a study of a real-life supply chain case study using simulation.

### 2.3 Bullwhip effect

Behind the objectives regarded to developing strategic connection between information sharing and supply chain coordination through business process reengineering and connecting existing theoretical studies with a real-life case study, this chapter has two more objectives. First, to examine the impact of information sharing with combinations of different inventory control policies on Bullwhip Effect and inventory holding costs, and second, to promote value of Bullwhip Effect as a common performance for supply chain coordination.

The Bullwhip Effect is a well-known phenomenon in supply chain management. In a single-item two-echelon supply chain, it means that the variability of the orders received by the manufacturer is greater than the demand variability observed by the retailer. This phenomenon was first popularised by Jay Forrester (1958), who did not coin the term bullwhip, but used industrial dynamic approaches to demonstrate the amplification in demand variance. At that time, Forrester referred to this phenomenon as 'Demand Amplification'. Forrester's work has inspired many researchers to quantify the Bullwhip Effect, to identify possible causes and consequences, and to suggest various countermeasures to tame or reduce the Bullwhip Effect (Boute & Lambrecht, 2007). One of those researchers is Lee (Lee et al., 1997a; Lee et al., 1997b) who named this phenomenon as 'Bullwhip Effect' and who identified the main causes of the Bullwhip Effect and offered solutions to manage it. They logically and mathematically proved that the key causes of the Bullwhip Effect are: (1) demand forecasting updating; (2) order batching; (3) price fluctuation; and (4) shortage gaming. According to this researcher, the key to managing the Bullwhip Effect is to share information with the other members of the supply chain. In these papers, they also highlighted the key techniques to manage the Bullwhip Effect.

A number of researchers designed games to illustrate the Bullwhip Effect. The most famous game is the 'Beer Distribution Game'. This game has a rich history: growing out of the industrial dynamics work of Forrester and others at MIT, it is later on developed by Sterman in 1989. The Beer Game is by far the most popular simulation and the most widely used games in many business schools, supply chain electives and executive seminars. Simchi-Levi et al., (1998) developed a computerized version of the Beer Game, and several versions of the Beer Game are nowadays available, ranging from manual to computerized and even web-based versions (Jacobs, 2000).

We can measure the Bullwhip Effect in different ways, but for the purpose of this research we accepted the measures applied in (Fransoo & Wouters, 2000). We measure the Bullwhip Effect as the quotient of the coefficient of variation of demand generated by one echelon(s) and the coefficient of variation of demand received by this echelon:

$$w = \frac{c_{out}}{c_{in}} \tag{1}$$

where:

$$c_{out} = \frac{\sigma\left(D_{out}\left(t,t+T\right)\right)}{\mu\left(D_{out}\left(t,t+T\right)\right)} \tag{2}$$

and:

$$c_{in} = \frac{\sigma\left(D_{in}\left(t,t+T\right)\right)}{\mu\left(D_{in}\left(t,t+T\right)\right)} \tag{3}$$

$D_{out}(t,t+T)$ and $D_{in}(t,t+T)$ are the demands during time interval $(t,t+T)$. For detailed information about measurement issues, see (Fransoo & Wouters, 2000).

## 3. Business process reengineering

### 3.1 Background

The key to supply chain coordination is not 'copy-pasting' best practice, which assume implementation of new information technology, from one company to another. Given the unique context in which each supply chain operates, the key to full coordination lies in the application of a context specific solution which is mostly regarded to business processes of the company.

The business process is a set of related activities which make some value by transforming some inputs into valuable outputs. In reengineering theories, organisational structures are redesign by focusing on business processes and their outcome. Business process reengineering may be seen as an initiative of the 1990s, which was of interest to many companies. The initial drive for reengineering came from the desire to maximize the benefits of the introduction of information technology and its potential for creating improved cross-functional integration in companies (Davenport & Short, 1990). Business redesign was also identified as an opportunity for better IT integration both within a company and across collaborating business units in a study in the late 1980s conducted at MIT. The initiative was rapidly adopted and extended by a number of consultancy companies and 'gurus' (Hammer, 1990). In business process reengineering, a business process is seen as a horizontal flow of activities while most organisations are formed into vertical functional groupings sometimes referred to in the literature as 'functional silos'. Business process reengineering by definition radically departs from other popular business practices like total quality management, lean production, downsizing, or continuous improvement. Business process reengineering is based on efficient use of information technology, hence companies need to invest large amount of money the achieve information technology enabled supply chain. Implemenation of new information technology is necessary, but no means sufficient condition for enable efficient and cheap information transfers. Business process reengineering is concerned with fundamentally rethinking and redesigning business processes to obtain dramatic and sustaining improvements in quality, costs, services, lead times, outcomes, flexibility and innovation. In support of this, technological change through the implementation of simulation modelling is being used to improve the efficiency and consequently is playing a major role in business process reengineering (Cheung & Bal, 1998).

### 3.2 Business process modelling

A business process model is an abstraction of business that shows how business components are related to each other and how they operate. Its ultimate purpose is to provide a clear picture of the enterprise's current state and to determine its vision for the future. Modelling a complex business requires the application of multiple views. Each view is a simplified description (an abstraction) of a business from a particular perspective or vantage point, covering particular concerns and omitting entities not relevant to this perspective. To describe a specific business view process mapping is used. It consists of tools that enable us to document, analyse, improve, streamline, and redesign the way the company performs its work. Process mapping provides a critical assessment of what really happens inside a given company. The usual goal is to define two process state: AS-IS and TO-BE. The AS-IS state defines how a company's work is currently being performed. The TO-BE state defines the optimal performance level of 'AS-IS'. In other words, to streamline the existing process and remove all rework, delay, bottlenecks and assignable causes of variation, there is a need to achieve the TO-BE state. Business process modelling and the evaluation of different alternative scenarios (TO-BE models) for improvement by simulation are usually the driving factors of the business renovation process (Bosilj-Vuksic et al., 2002). In the next section a detailed case study is presented.

## 4. A case experience of business process reengineering

The case study is a Serbian oil downstream company. Its sales and distribution cover the full range of petroleum products for the domestic market: petrol stations, retail and industries. The enterprise supply chain comprises fuel depot-terminal (or distribution centre), petrol stations and final customers. The products are distributed using tank tracks. The majority of deliveries is accomplished with own trucks, and a small percentage of these trucks is hired. The region for distribution is northern Serbia. It is covered by two distribution centres and many petrol stations at different locations. In line with the aim of the chapter only a fragment, namely the procurement process, will be shown in the next section. Presented model was already used in (Groznik & Maslaric, 2010), and a broader description of the case study can be found in (Maslaric, 2008).

From the supply chain point of view, the oil industry is a specific business, and for many reason it is still generally based on the traditional model. The product is manufactured, marketed, sold and distributed to customers. In other industries, advanced supply chain operation is becoming increasingly driven by demand-pull requirements from the customer. There is a strong vertically integrated nature of oil companies and that may be a potential advantage. In other industries, much attention is focused on value chain integration across multiple manufacturers, suppliers and customers. In the oil industry, more links in the chain are 'in house', suggesting simpler integration. In practice, there is still a long way to go to achieve full integration in the oil supply chain.

### 4.1 AS-IS model development

The next section covers the modelling of the existing situation (AS-IS) in the procurement process of the observed downstream supply chain case study. The objective was to map out in a structured way the distribution processes of the oil company. The modelling tools used in this case study come from the Igrafx Process. These modelling tools were applied in order to identify the sequence of distribution activities, as well as the decisions to be taken in various steps of the distribution process. The AS-IS model was initially designed so that the personnel involved in the distribution processes could review them, and after that the final model shown in Figure 1 was developed.

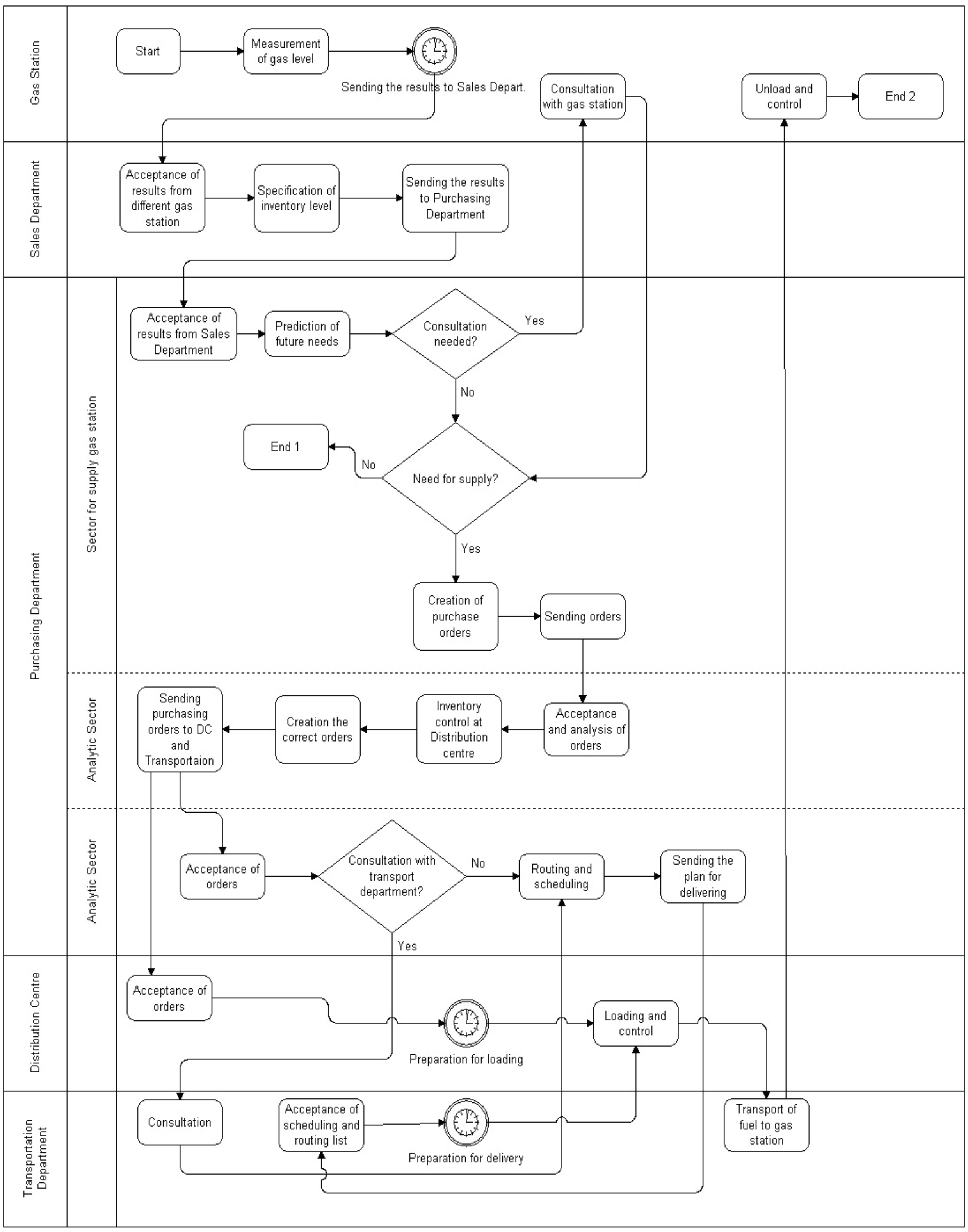


Fig. 1. AS-IS model of the process

The core objective of supply chains is to deliver the right product at the right time, at the right price and safely. In a highly competitive market, each aims to carry this out more effectively, more efficiently and more profitably than the competitors. Because both the prices and quality of petrol in Europe are regulated, the main quality indicator in oil supply chains is the number of stock-outs. The main cost drivers are therefore: number of stock-outs, stock level at the petrol station and process execution costs. Lead time is defined as the time between the start (measurement of the stock level) and the end (either the arrival at a petrol station or the decision not to place an order) of the process (Trkman et al., 2007).

The main problems identified when analysing the AS-IS model relate to the company's performance according to local optimisation instead of global optimisation. The silo mentality is identified as a prime constraint in the observed case study. Other problems are in inefficient and costly information transfer mainly due to the application of poor information technology. There is no optimisation of the performance of the supply chain as a whole. Purchasing, transport and shipping are all run by people managing local, individual operations. They have targets, incentives and local operational pressures. Everything was being done at the level of the functional silo despite the definition that local optimisation leads to global deterioration. The full list of problems identified on tactical and strategic levels are identical to those in (Trkman et al., 2007), so for greater detail see that paper. Based on the mentioned problems, some improvements are proposed. The main changes lie in improved integration of whole parts of the supply chain and centralised distribution process management.

### 4.2 TO-BE models development

The emphasis in business process reengineering is put on changing how information transfers are achieved. A necessary, but no means sufficient condition for this is to implement new information technologies which enable efficient and cheap information transfers. Hence, information technology support is not enough as deep structural and organisational changes are needed to fully realise the potential benefits of applying new information technology. In this case study we develop two different propositions for business process reengineering (two TO-BE models) to show how implementation of new information technology without business process renovation and the related organisational changes does not mean the full optimisation of supply chain performance.

The first renewed business model (TO-BE 1) is shown in Figure 2 and represents the case of implementing information technology without structural changes to business processes. In the TO-BE 2 model, there is no integrated and coordinated activity through the supply chain. Inventory management at the petrol stations and distribution centre is still not coordinated.

The TO-BE 2 model assumes that the processes in the whole downstream oil supply chain are full integrated and the distribution centre takes responsibility for the whole procurement process. The TO-BE 2 business model is shown in Figure 3. The main idea is that a new organisational unit within the distribution centre takes on a strategic role in coordinating inventory management and in providing a sufficient inventory level at the petrol stations and distribution centre to fulfil the demand of the end customer. It takes all the important decisions regarding orders in order to realise this goal. Other changes proposed in the TO-BE 2 model are the automatic measurement of petrol levels at petrol stations and the automatic transfer of such data to the central unit responsible for petrol replenishment; the predicting of future demand by using progressive tools; and using operations research methods to optimise the transportation paths and times. The role of information technology in all of these suggestions is crucial.

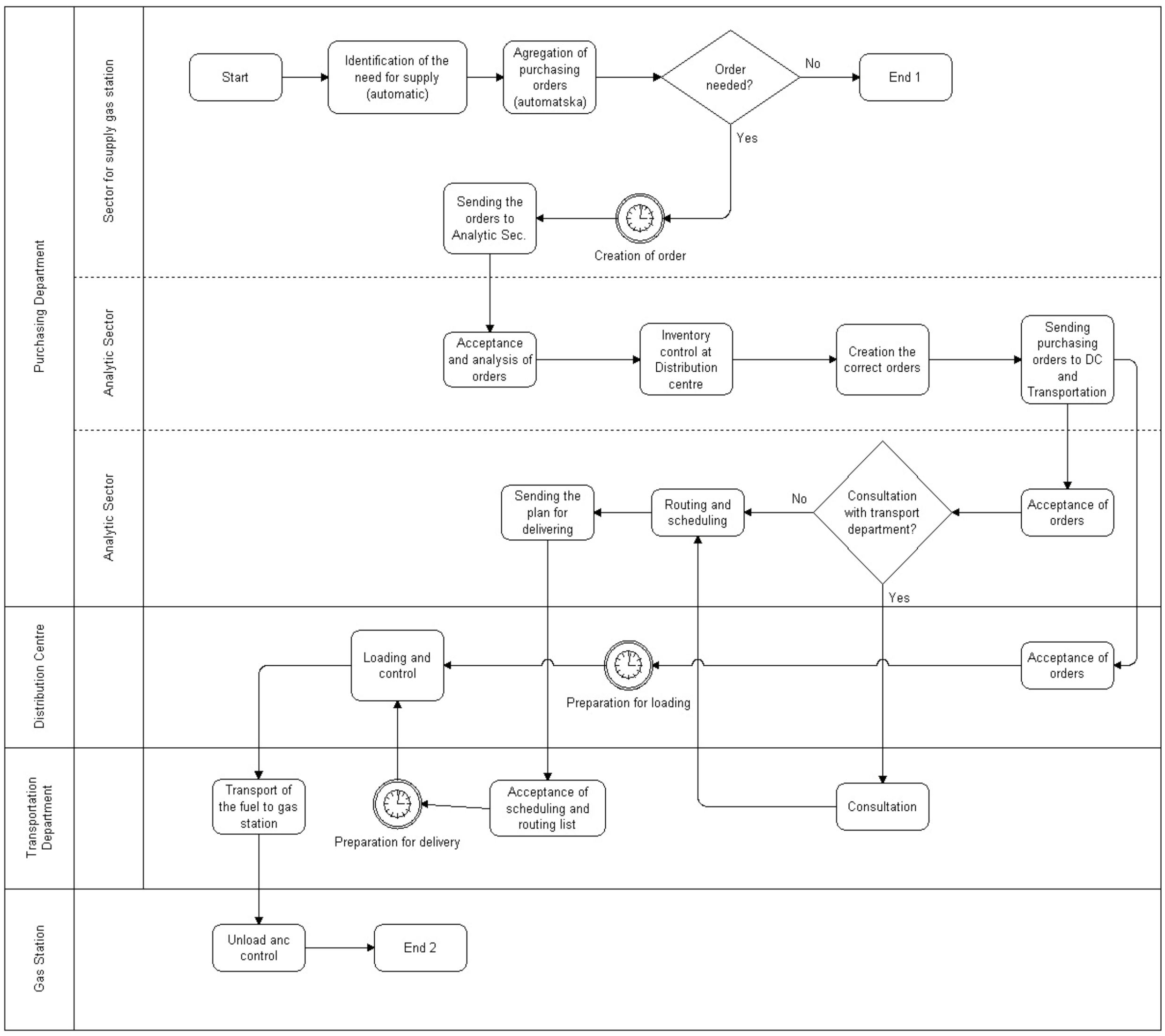


Fig. 2. TO-BE 1 model of the process

#### 4.3 Measuring the effect of reengineering

The effect of the changes can be estimated through simulations. Because our study has two kinds of objective, we have two kind of simulations. In our first example we simulated business processes to investigate the impact of business process reengineering on the information sharing value, measured by lead times and transactional costs. The second simulation, which partly uses the results of the first simulation, represents an object-oriented simulation which helps define the impact of information sharing and appropriate inventory control on the Bullwhip Effect and inventory holding costs in the oil downstream supply chain under consideration. Both simulations are especially important as they enable us to estimate the consequence of possible experiments.

In the first simulation we estimated changes in process execution costs and lead times. First a three-month simulation of the AS-IS and of both the TO-BE models was run. In the AS-IS model a new transaction is generated daily (the level of petrol is checked once a day), and in the TO-BE it is generated on an hourly basis (the level of stock is checked automatically every hour). The convincing results are summarised in Table 1. The label 'Yes' refers to

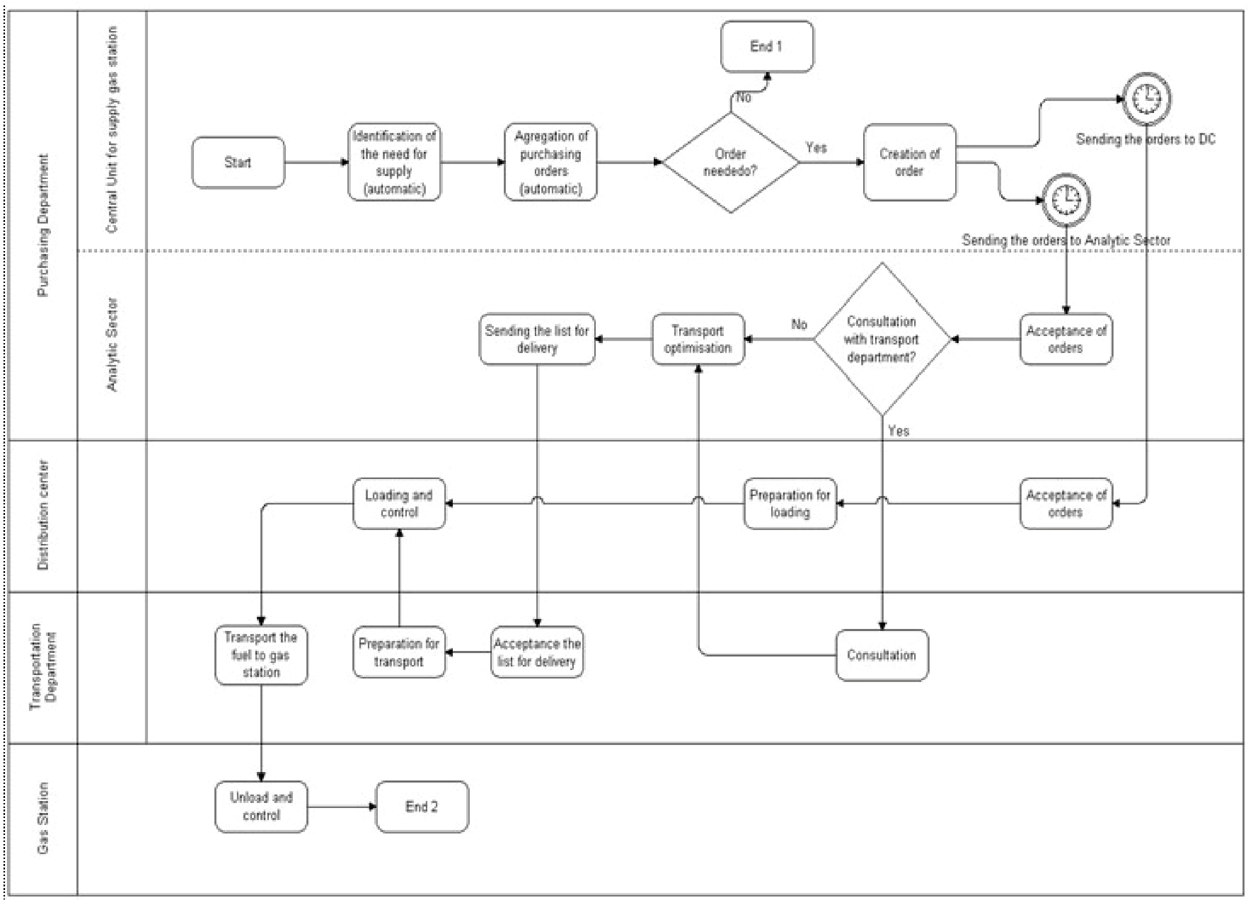


Fig. 3. TO-BE 2 model of the process

those transactions that lead to the order and delivery of petrol, while the label 'No' means a transaction where an order was not made since the petrol level was sufficient. The average process costs are reduced by almost 50%, while the average lead time is cut by 62% in the case of the TO-BE 2 business model. From this it is clear that this renovation project is justifialbe from the cost and time perspectives. The results in Table 1 show that a full improvement in supply chain performances is only possible in the case of implementing both new information technology which enables efficient information sharing, and the redesign of business processes. The mere implementing of information technologies without structural and organisational changes in business processes would not contribute to realising the full benefit.

| Transaction | No. | Av. lead-time (hrs) | Av. work (hrs) | Av. wait (hrs) | Average costs (€) |
|---|---|---|---|---|---|
| Yes (AS-IS) | 46 | 33.60 | 11.67 | 21.93 | 60.10 |
| No (AS-IS) | 17 | 8.43 | 2.40 | 6.03 | 8.47 |
| Yes (TO-BE 1) | 46 | 27.12 | 10.26 | 16.86 | 56.74 |
| No (TO-BE 1) | 1489 | 0.00 | 0.00 | 0.00 | 0.00 |
| Yes (TO-BE 2) | 46 | 12.85 | 4.88 | 7.98 | 32.54 |
| No (TO-BE 2) | 1489 | 0.00 | 0.00 | 0.00 | 0.00 |

Table 1. Comparasion of simulation results for the AS-IS and TO-BE models

The results of the previous simulation (lead time) were used as an input for the next simulation so as to help us find the impact of information sharing on the Bullwhip Effect and inventory holding costs in the observed supply chain.

## 5. Inventory control simulation

In this section we employed an object-oriented simulation to quantify the benefit of information sharing in the case study. The system in our case study is a discrete one since supply chain activities, such as order fulfilment, inventory replenishment and product delivery, are triggered by customers' orders. These activities can therefore be viewed as discrete events. A three-month simulation of the level of stock at a petrol station that is open 24 hours per day was run.

In order to provide results for the observed supply chain performance, the following parameters are set:

- *Demand pattern*: Historical demand from the end customer to petrol stations and from petrol stations to distribution centres was studied. From this historical demand, a probability distribution was created.
- *Forecasting models*: The exponential smoothing method was used to forecast future demand.
- *Information sharing*: Two different types of information sharing were considered: (1) No IS-no information sharing (AS-IS model); and (2) IS-full information sharing (TO-BE models).
- *Lead time*: Lead time from the previous simulation business process was used.
- *Inventory control*: Three types of inventory replenishment policy were used: (1) No inventory policy based on logistical principles. There was a current state in the viewed supply chain (AS-IS model); (2) The petrol station and distribution centre implement the (s, S) inventory policy according to demand information from the end customer, but the distribution centre was not responsible for the petrol station's replenishment policy – no VMI policy (TO-BE 1 model); and (3) VMI – full information sharing is adopted and the distribution centre is in charge of the inventory control of the petrol station. The one central unit for inventory control determines the time for replenishment as well as the quantities of replenishment (TO-BE 2 model).
- *Inventory cost*: This is the cost of holding stocks for one period.
- *Bullwhip Effect*: The value of the Bullwhip Effect is measured from equations (1), (2) and (3).

When we talk about inventory control, regular inventories with additional safety stock are considered. These are the inventories necessary to meet the average demand during the time between successive replenishment and safety stock inventories are created as a hedge against the variability in demand for the inventory and in replenishment lead time. The graphical representation of the above mentioned inventory control method is depicted in Figure 4 (Groznik & Maslaric, 2009; Petuhova & Merkuryev, 2006).

The inventory level to which inventory is allowed to drop before a replacement order is placed (reorder point level) is found by a formula:

$$s = E(X) * LT + STD(X) * \sqrt{LT} * z \tag{4}$$

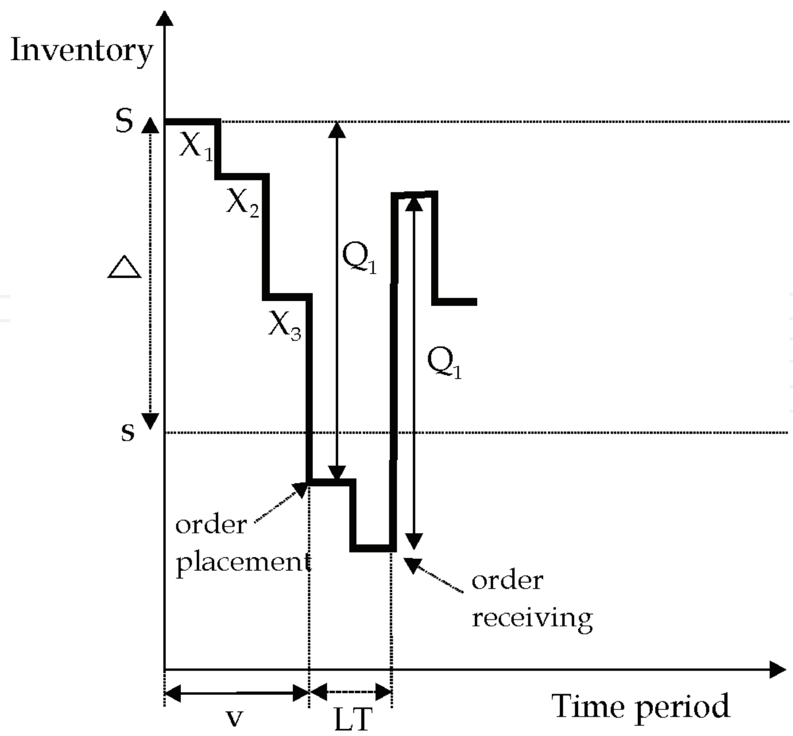


Fig. 4. Inventory control method

where:
*LT* – lead time between replenishment;
$STD(X) = \sqrt{D(X)}$ - standard deviation of the mean demand;
*z* – the safety stock factor, based on a defined in-stock probability during the lead time.
The total requirements for the stock amount or order level S is calculated as a sum of the reorder point level and a demand during the lead time quantity:

$$S = s + E(X)*LT \tag{5}$$

The order quantity $Q_i$ is demanded when the on-hand inventory drops below the reorder point and is equal to the sum of the demand quantities between the order placements:

$$Q_i = X_1 + X_i + \ldots + X_v \tag{6}$$

Where v is random variable, and represents a number of periods when an order is placed.
While the demand *X* is uncertain and implementing such a type of inventory control method, placed order quantity Q is expected to be a random *variable* that depends on the demand quantities.
To investigate the effect of information sharing upon supply chain performance (Bullwhip Effect and inventory costs), three scenarios are designed with respect to the above parameters:

- *Scenario 1*: No IS, no defined inventory control, (AS-IS model);
- *Scenario 2*: IS, no VMI, (TO-BE 1) model; and
- *Scenario 3*: IS, VMI, (TO-BE 2) model.

The simulation was run using GoldSim Pro 9.0. The performance measures derived from the simulation results are summarised in Figure 5 and Figure 6. The results from Figure 5 show that the value of the Bullwhip Effect is smallest for Scenario 3, which assumed full information sharing with appropriate structural changes of business processes, and full coordination in inventory control across the supply chain. These results also show that fully utilising the benefit of implementing information technology and inventory management based on logistical principles can decrease the value of Bullwhip Effect by 28% in the observed case study.

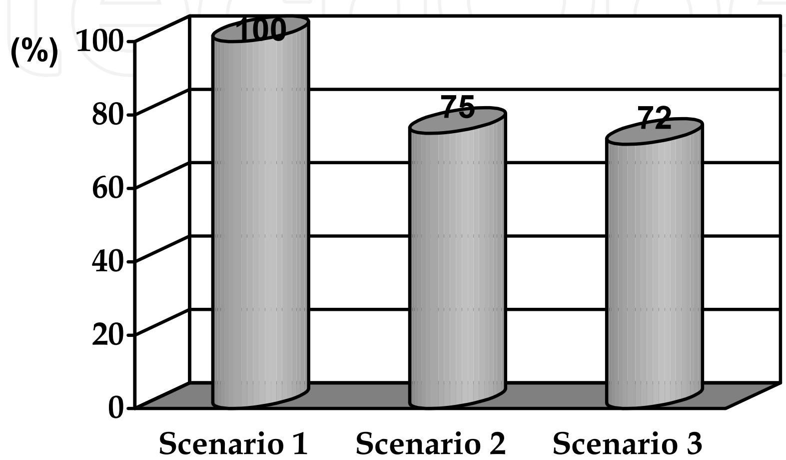


Fig. 5. Bullwhip effect value comparasion of three scenarios

In Figure 6 a comparison of inventory costs with regard to the scenarios is shown. The minimum inventory holding costs are seen in Scenario 3, like in the first case. The result from Figure 5 show that benefits from the application of new information technology, business process reengineering and coordinated inventory policy, expressed by decreasing inventory holding costs, could be 20%.

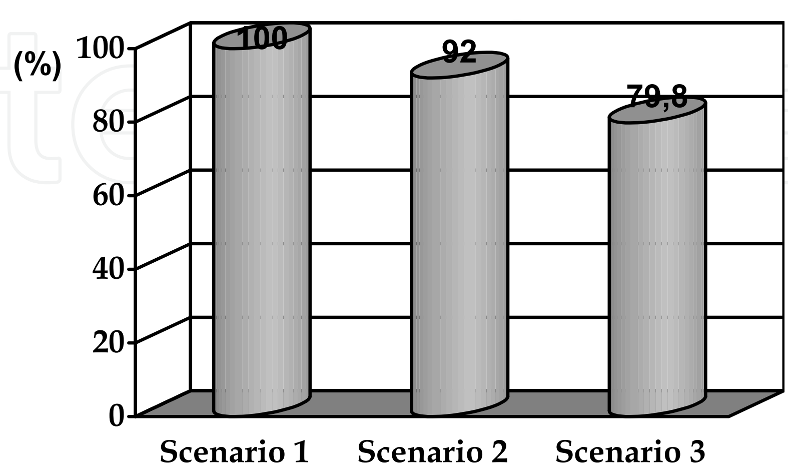


Fig. 6. Inventory costs comparasion of three scenarios

## 6. Conclusion

Supply chain management has become a powerful tool for facing up to the challenge of global business competition because supply chain management can significantly improve supply chain performance. This chapter explores how achieving only successful business process changes can contribute to the full utilisation of improved sharing, and so to the full coordination of the supply chain. The conclusions of the simulation experiments are: information sharing can enhance the performance of the supply chain. In addition, business process reengineering and coordination are also important mechanisms in the supply chain to improve performance. Coordination can reduce the influence of the Bullwhip Effect and improve cost efficiency. In the previous literature there were not many connections between theoretical studies and a real-life complex case study. This chapter is hence one of the few attempts in this direction. This research represents a part of the project financed by the Ministry of Serbia.

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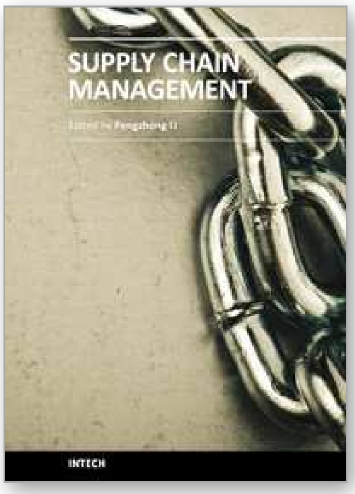


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The purpose of supply chain management is to make production system manage production process, improve customer satisfaction and reduce total work cost. With indubitable significance, supply chain management attracts extensive attention from businesses and academic scholars. Many important research findings and results had been achieved. Research work of supply chain management involves all activities and processes including planning, coordination, operation, control and optimization of the whole supply chain system. This book presents a collection of recent contributions of new methods and innovative ideas from the worldwide researchers. It is aimed at providing a helpful reference of new ideas, original results and practical experiences regarding this highly up-to-date field for researchers, scientists, engineers and students interested in supply chain management.