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MASTER'S THESIS

BUSINESS PROCESS MODELLING AND IMPROVEMENT – THE CASE OF AN OIL AND GAS COMPANY

Ljubljana, September 2018   ANA PETROVSKA

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

BPM - Business process management

BPMN - Business Process Model and Notation

BPR - Business process reengineering

CEO - Chief executive officer

CMR - 'Convention Relative au Contrat de Transport International de Marchandises par la Route' - Standardized document for cross-border transport of cargo by road

CogNIAM - Cognition enhanced Natural language Information Analysis Method

CRM - Customer Relationship Management

CSMP - Council of Supply Chain Management Professionals

E&P - Exploration and production

ERP - Enterpirse Resource Planning

FELU – Faculty of Economics

LML - Life-cycle Modelling Language

LPG - Liquefied petroleum gas

NPC - National petroleum council

OPEC - The Organization of the Petroleum Exporting Countries

ROI - Return on Investment

SC - Supply chain

SCC - Supply Chain Council

SCM – Supply chain management

SCOR - Supply chain operations reference

xBML - Extended Business Modelling Language

INTRODUCTION

"Supply chain (SC) is a dynamic process that entails a continuous flow of information, materials and funds across multiple functional areas, within and between chain members in order to meet customer's requirements and to maximize their profit" (Jain, Wadhwa, & Deshmukh, 2009, p. 3013).

A supply chain includes everyone involved to get the product in the hands of the customer. Mohanty and Deshmukh (2005) define Supply Chain Management (SCM) as loop that starts with a customer and ends with a customer. Through the loop flow seamless business processes supported by business functions. SCM is the integration of all key business processes, looking at business as one continuous business transaction (Lambert, 2004).

"Procurement is the process of getting the goods you need, while supply chain is the infrastructure needed to get you those goods" (Kolenko, 2014). Procurement is an act of organizing the supply of the company with direct and indirect materials/services for business purposes, which involves purchase planning, specifications determination, supplier selection, financing, pricing and control of inventory (Johnson, 2014).

Both the supply chain management and procurement are of particular importance for the oil and gas industry (Trkman, Indihar Štemberger, Jaklič, & Groznik, 2007). Supply chains in this industry include domestic and international logistics, warehouse management and inventory control, materials and resource management, import and export facilitation, and use of information technology. This complexity is a reason for the oil and gas industry to be taken as an individual industry with its own right (Chima & Hills, 2007).

An oil and gas supply chain starts with simply moving the product from point A to point B that actually includes previous selecting of the right source to get it from, then deciding about the right quantity to move and the right market to send it to. Additionally, a decision for the right warehouse, the right transport and the right route needs to be done. Changes in the market, technology and competitors occur very often in the oil and gas industry. As a result, managers may need to reconsider their decisions on shorter notice, before the commodity arrives at its final destination. This process starts from data capture to data analytics, followed by the ability to analyze information and create optimal scenarios (Rosendahl, 2012).

The changes in the market mean that companies in the supply chain need to come up with new ways of solving old problems that will help the company to achieve superior profitability. That means to discover new ways of working or preforming any tasks along the supply chains that add value to the company. For example, providing better customer service, filling orders, optimizing core business links, investing in better connections with suppliers etc (Chima & Hills, 2007).

The success of supply chains depends on the match between the requirements and offerings that deliver the services to customers. Each customer is different and has his own needs and perceptions. Therefore, it is very important to know how to improve the customer relationship and find a better way to cooperate that will result in positive outcomes for both sides (Botha & Van Rensburg, 2010).

Companies have started to implement operational innovations using business process management (BPM) with the purpose of gaining competitive advantages (Siriram, 2012). It is well-known that in companies from oil and gas industry almost all significant operations are planned in advance. Thus, the whole workflow can be handled and fine-tuned into a high performance money making business (Davenport, 1993). Generally, oil and gas companies should understand the use of BPM and see their supply chain as worthy of improvement.

It is necessary to visualize, link, and manage the core processes of a company in a more integrated, cohesive, and balanced manner. Business process model and notation (BPMN) is one of the most preferable methods to use in representing the companies processes (Kocbek, Jošt, Heričko, & Polančič, 2015) and helps to deepen the knowledge of the workflow and dependences between the activities. Similarly, another study illustrates the use of business process modelling, business process redesign and integration of processes, in improving the procurement process in an oil/retail petrol industry (Trkman, Indihar Štemberger, Jaklič, & Groznik, 2007).

However, determining and selecting the right process for improvement is a very difficult decision. It is a long procedure to observe, investigate and model the processes. What is more, it requires a certain amount of knowledge in order to be able to seek for potential improvements. If a company controls and understands most of the processes in a supply chain, it can lower the time period needed to respond to a threat or a problem that has occurred.

The motivation for this research is to understand the environment of a dynamic supply chain by looking into a specific company in Macedonia, whose main activity is import and export of liquefied petroleum gas (LPG). The main purpose of this thesis is to define, analyze and model the critical processes of a selected company in the oil and gas industry and to shed some light on the existing challenges and opportunities for improving the workflow efficiency. The desired result of the research is to define and make an analysis of the company's critical processes, by explaining the AS-IS model of processes, concepts and architecture.

Therefore, the main research questions are:

1. How processes can be better managed to improve the workflow efficiency?
2. How process improvements can be implemented and which outcomes should be expected?

The general objective of the thesis requires broader knowledge of the supply chains in the oil and gas industry and drivers of process innovation that are discussed by the vast majority of literature. In addition, the more specific objectives include extending the perception of the functioning of dynamic supply chain capabilities and dynamic supply performance towards strategies and process of decision making.

The most appropriate approach for analyzing and answering these research questions is a case study (Yin, 2003). A qualitative approach is preferred to explain the link and coordination of the resources and flow of information among the processes. To collect the data relevant for the case study, I organized workshops with the employees responsible for the business processes and conducted individual interviews with each of them. In addition, to support the relevance of the research and gain better understanding of the workflow, I was given permission to observe the work and have access to confidential material and documentation.

This master thesis is organized into three chapters. The first chapter reviews the related literature for SCM and BPM. The first part of this chapter provides general explanation of supply chains, their characteristics, challenges and possibilities for increasing the work efficiency. Furthermore, it explains the business process modelling and points out the reasons why this method should be used in defining and examining the critical processes in this case study. The last part of this chapter, first explains the oil and gas industry and its specifics and then presents the SCM in oil and gas industry. Next, the second chapter of the thesis is research methodology and it explains how the plan for the execution of case study was developed and implemented. The third chapter provides the results of the two main objectives of the research. In first part of the chapter are described the process models and process dependences. Additionally, it includes explanation of relevant roles and supportive functions. In the second part, the opportunities for process improvements are examined. Additionally, a summary of the main benefits is provided. The thesis finishes with concluding remarks and recommendations for possible topics for further research.

1 LITERATURE REVIEW

1.1 Supply chain management

The earliest appearance of the term SCM - supply chain management appeared in Financial Times article written by Oliver and Webber in 1982. They describe the activities performed by an organization in procuring and managing supplies and define the SCM as a new approach to explain the trade-offs between key functions – purchasing, production, distribution and sales (Oliver and Webber, 1982).

The globalization, technological innovations, harsh competition and heightened customer expectation changed the business environment through the years and brought into focus the SCM. Everything in SCM is driven by the needs and wants of the customer. Therefore, the companies start to see the management's issues, followed by corrective actions, from the supply chain perspective (Lu, 2011).

SCM provides an effective oversight, control and integration of the materials, money and information, as they move from supplier to manufacturer, to wholesaler, to retailer, to customer. I consider this as the most appropriate definition and explanation of supply chain (Chopra & Meindl, 2007).

Christopher (2016, p. 3) similarly defines SCM as "The management of upstream and downstream relationship with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole".

Figure 1.Overview of upstream and downstream activities in a supply chain
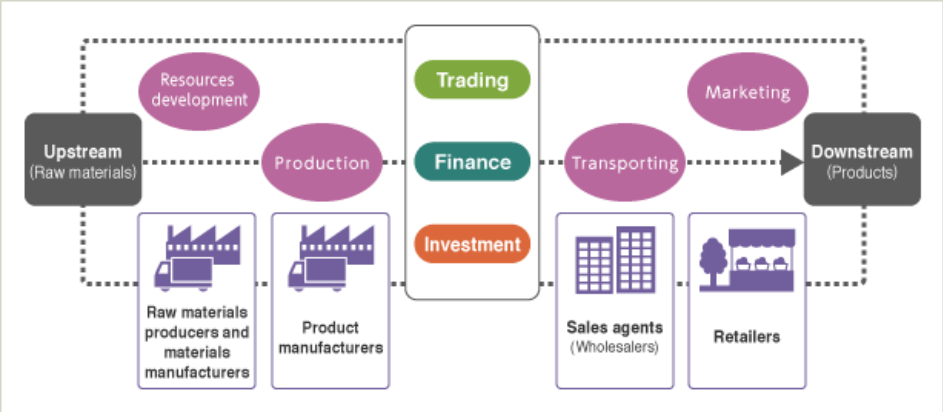
Source: Business model (n.d.).

Money move upstream (from customer to the source), materials move downstream (through the supply chain) and information flow in both ways. Typical supply chain activities include forecasting in all segments (Towill, 1996). Figure 1 shows the flows and how the typical supply chain activities are located from upstream to downstream side in supply chain network.

The supply chain can be seen as a complex system that involves multiple actors. Each supply chain has its own customers, suppliers, manufactures, inventory management strategies and warehouses, demand planning, forecast methods and internal resources. The main objective of the SCM is 'the right quantity at the right time and in the right place'. In order to achieve that, the SCM needs to be able to quickly react and respond to the chances given by the market. There needs to be balance between two desirable but incompatible factors, such as resources management and internal costs or sales loss and inventory costs (Longo, 2011).

The Global Supply Chain Forum identified eight key processes that make up the core of supply chain management:

- Customer relationship management – explains how the relationship between the customer and company is developed and maintained;
- Customer service management – is single source of data for the customer. Customer service management is the company's face to the customers and always needs to be prepared to provide information about the availability of the product, shipping dates and order status;
- Demand management – analyzes sales history and tries to balance what the customers require and what the firms is able to supply. It needs to prepare contingency plans and predict all different scenarios triggered by various external or internal factors;
- Manufacturing flow management – is responsible for producing the products and obtaining, implementing and managing flexibility;
- Product development and commercialization – in order to remain competitive on the market, the product development team needs to integrate the requirements of both sides, suppliers and customers, into the product development process;
- Returns management – is a process of management of returned products, which activities are associated with planning, implementing and controlling backwards flows of the products, to a point of recovery or proper disposal (Lambert, 2004; Cooper, Lambert, & Pagh, 1997).

Detailed description of the procurement and order fulfillment process will be provided in the next section, due to the connection to the empirical part of the thesis, where both processes are analyzed for the aim of the case study.

Supply chain operations reference (SCOR) model developed by the Supply Chain Council (SCC) can be taken into consideration as an alternative approach to define processes in a supply chain. The four distinct processes for the model are source, make, deliver and plan. The SCOR model provides standard terminology, standard descriptions of the business processes, common metrics and best management practices. It is defined as a strategic planning tool that helps the managers to simplify the complexity of the supply chain management (Huan, Sheoran, & Wang, 2004).

1.2 Procurement and order fulfillment process

1.2.1 Procurement process

Procurement process consists of all the required activities to get the product from the supplier to its final destination. The procurement process includes purchasing function, warehouse and inventory, transportation, inspections, quality control and assurance (Van Weele, 2010).

With spending less time on purchase planning, the small businesses can use their resources for generating more creative and profitable activities (Dobler, 1965). Presutti (1988) discusses that 82 % of the small firms in his study agreed that the purchasing process is the main driver to increase their company's profit. Moreover, Paik, Bagchi, Skjøtt-Larsen, and Adams (2009), in their research for small firms based in Denmark, Indiana and California, came to the result that purchasing had significant impact on the profitability of the companies.

Figure 2. Example of a company's profit-loss account

Total sales	=	£10,000,000
Purchased Service / materials	=	£7,000,000
Salaries	=	£2,000,000
Overheads	=	£500,000
Profit	=	£500,000

Source: Lu (2011).

Lu (2011) gives a very interesting example of how important the procurement process is. Imagine that we have the overview of the profit-loss account for current year, as the one in Figure 2. The shareholders demanded to the chief executive officer (CEO) to provide double value of the profit in the next year. We look at each element in the table, assuming the others to remain the same. First, the sales are hard to double because they are dependent on the demand of the market. Then, if salaries need to be decreased, we must make 25 % decrease. In this case, the CEO salary will actually have the biggest decrease. Another alternative is to cut the overhead costs (even though it is almost impossible) that will result only 500,000£ savings, which is not equal to double increase of profit. Last, if the purchasing function reduce for 7 % that will result 100 % increase of profit. Therefore, we can see how big impact the purchasing function has directly on the profit.

A classic procurement cycle, adopted from two different books Monczka, Handfield, Giunipero, and Patterson (2015) and Baily, Farmer, Crocker, Jessop, and Jones (2008), includes following steps:

1. identification of need;
2. clarify need;
3. identify and select a supplier;
4. approval, contract and purchase order;
5. delivery of product or service; and
6. payment.

In the paper "Purchasing Must Become Supply Management" in Harvard Business Review in Sepremtber 1983, Kraljic presented the well-known Kraljic Purchasing Portfoilo model (see Figure 3).

Figure 3. Kraljic purchasing portfolio martix

Source: Lu (2011).

Kralijc provides explanation for each segment of products and suggest purchasing strategy and corrective steps to achieve market competitiveness. The focus of this master thesis is the oil and gas industry, so I will provide just an overview of the segment – Strategic products. The Strategic products have high supply risk. On the other hand, they have big financial impact on the company's profit. That means that the company needs to regularly analyze, manage risks and plan for contingencies. Kraljic suggests maintaining a strategic partnership, because the strategy products include specific requirements and it is not so easy to find another supplier (Kraljic, 1983).

Therefore, we can say that the critical task is supplier selection, due to the fact that this type of strategy is directly connected with suppliers (Caniels & Gelderman, 2005). Tuten and Urban (2001) discuss how that close relationship with suppliers over time will lead to product quality improvements, shorter lead times, delivery reliability and maybe even result in cost reduction.

1.2.2 Order fulfillment

The integration of the company's manufacturing, logistics and marketing plans is needed to provide design of distribution network, which leads to effective order fulfillment. Measures of the efficiency of this process are order to cash cycle, order fill rate and order completeness. The goal is the order to be on time and in full. Key inputs for order fulfillment are manufacturing capabilities, lead-times and customer service requirements (Kumar, Akhil, & Graham Sharman, 1992).

The study by Cooper and Ellram (1993) provides framework to differentiate the traditional system and supply chain management system. In addition, a particular focus is put on the implications of SCM for purchasing and logistics functions. They explain that purchasing

is more aligned with requirements, planning changes and payment, while logistics directly interact with marketing and customer service. "The order fulfillment operational process defines the specific steps regarding how customer orders are: generated and communicated, entered, processed, documented, picked, delivered, and handled post-delivery." (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001, p. 21).

In order to reduce total delivered costs to customers, the company needs to understand the customer requirements. This shows us how order fulfillment is interconnected with customer relationship management and customer service processes (Lambert & Stock, 1993). Christopher (1998) using the classification: "pre-transaction", "transaction" and "post-transaction" elements, discusses the customer service processes. For "pre-transaction" period, the customer relationship management needs to be available and make effort to explain to the customer what the company is able to supply. In addition, the company must be able to adapt to various customer orders and meet particular customer needs. Then between the order and delivery are transaction elements – order cycle time, delivery preciseness and order status information. After the customer receives the product, the post-transaction elements appear, for example correct billing or availability of spares.

Next, the evaluation of logistics network is an important step in designing the plan of order fulfillment, as logistics have a big impact on the costs and system performance (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001). Council of Logistics Management in 1998 defined logistics as a subset of supply chain management. Figure 4 represents the evolution of logistics integration and change of the traditional perspective, showing that today logistics combines most of the functions and is really important part of SCM.

Figure 4. Evolution of logistics integration
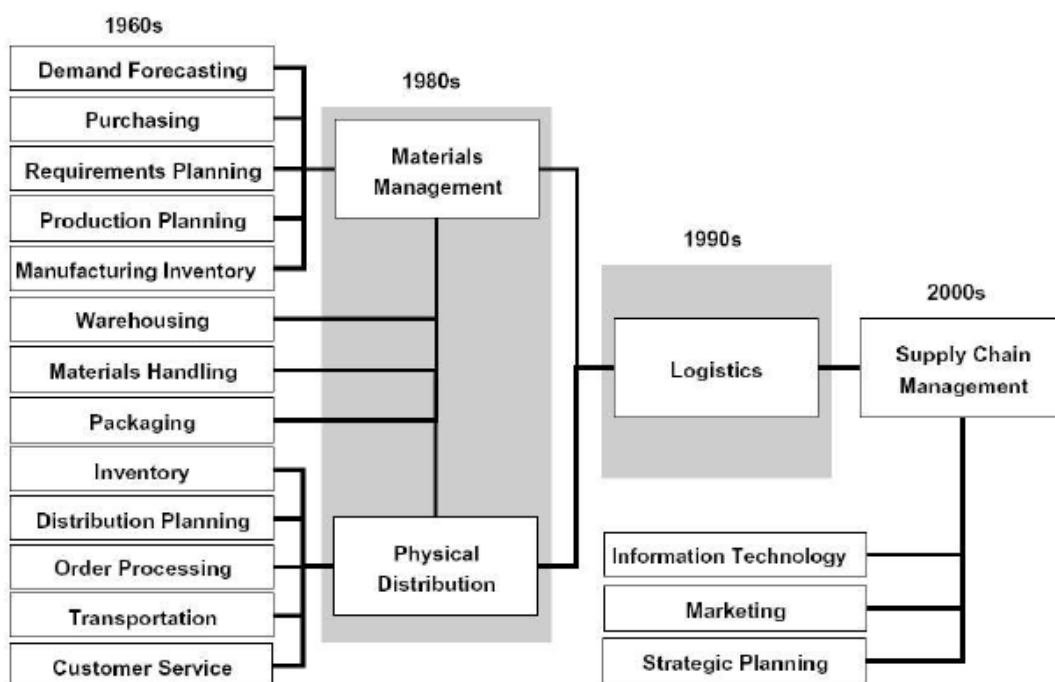
Source: Hesse & Rodrigue (2004).

8

We can see that all functions connected to transport and distribution, which were defined as separate segments in 1960s, were slowly developing through the years and became more related and dependent, to finally merge and declare as logistics. Ballou (2007) explains the past, present and future assumptions about logistics and how logistics become part of supply chain management. Logistics performance can be defined from a point of efficiency view – meaning fulfillment of customer requirements and economical operation view - as utilization rate of resources for accomplishment of a service.

Therefore, logistics seeks to meet the customer's needs and preferences, including set of related activities: planning, controlling and performing the tasks of packaging, inventory, transport, cargo handling and distribution of products (Soliani, n.d.), plus loading, unloading, internal and external movements (Council of Supply Chain Management Professionals, 2013).

Inventory management is one of the business processes that relates to logistics. Inventory management uses different techniques and management principles to regulate the storage of products and usage of facilities (Oluwaseyi, Onifade, & Odeyinka, 2017). For better inventory management, Longo (2011, p. 96) states that companies need to focus on three main questions:

1. How often to review the stock status?
2. When to order new products?
3. Quantity of new products.

Moreover, Tagaras and Vlachos (2001) suggest an interesting approach to study the effects of inventory control in SCM. In their study, periodic-review inventory control policy is explained, working with two replenishment modes: regular and emergency. Besides the regular orders with deterministic lead time, emergency orders should be taken as an option when a stock out is about to happen. They are characterized with shorter lead times and higher acquisitions costs.

1.3 Benefits of information technology use in supply chain management

The empirical study of Auramo, Kauremaa, and Tanskanen (2005) consisted of a survey of 48 companies that implemented IT solutions in their SCM and 18 case studies to identify mechanisms for providing IT benefits in their SCM. The study defined five propositions on the IT use and benefits in SCM.

1. Improved customer service elements
2. Improved efficiency allows employees to focus more on critical business activities
3. Improved information quality
4. Improved agility of the supply network and practicing planning collaboration

5. In order to gain strategic benefits, the use of IT needs to be combined with process redesign

The study shows how based on the implementation method, the benefits of IT in SCM are different and vary from company to company. In addition, the authors come to conclusion that the use of IT is related to process changes. It can be said that SCM process changes are enabled or helped by IT. Or, it may also be in reverse way, SCM process change to be derived by IT. In existing literature, also other authors discuss about the link between IT use and business processes as crucial ingredient in providing benefits from development efforts (example: Venkatraman, 1994; Hammer, 1990; Davenport & Short, 1990). Also, the study mentions the purchasing function as traditionally labor-intensive activity, including non-value adding activities, such as data entry or corrections of errors in paperwork, which can be eliminated with IT.

Novack (1989) postulates the major role of information in process of decision making and effective control. Kulp (2002) also talks about the information precision and how the data is important for enhancing supply chain profitability. He mentions the importance of implementation of vendor managed inventory in dyadic business relationships. Supportive arguments for the importance of information systems and data usage for effective coordination across the supply chain and within a company, also can be found in following articles: Bagchi (1992), Bowersox and Daugherty (1995), Cavinato, (1999), Holmberg (2000), Stank, Davis, and Fugate (2005) and Germain and Iyer (2006).

Accurate data and information can be used for both, formal and informal communication. Informal meetings and communication bring forward employees thinking and ideas and develop better organizational culture and awareness (Gattorna & Hargreaves, 1991; Barratt & Oliveira, 2001). While formal communication contributes to better forecast accuracy, better coordination and provide value (Mentzer & Schroeter, 1994).

The connection between information and performance is mentioned early in literature (Mentzer & Konrad, 1991; Mentzer & Firman, 1994). Standard databases and uniform coding schemes are one of the necessities for better aligning the operations across the supply chain. It is enough to start with the usage of links and interfaces in an inter-organizational setting, which later will slowly spread and bring positive effect across the whole chain (Jeschonowski, Schmitz, Wallenburg, & Weber, 2009). Information exchange between partners results in better responsiveness, time efficiency, demand transparency and inventory reduction (Savitskie, 2007).

Castilla and Longo (2010) pay attention to the use of different applications, tools, techniques and ad-hoc methodologies as the only way to diagnose, investigate and overcome problems, explore possibilities and identify proper and optimal solutions for complex supply chains. Today a lot of different techniques and decision-making tools exist that are capable for analyzing different scenarios by using multiple performance measures

and user-defined set of input-parameters. Every supply chain is specific and depending on the need, managers need to make the right choice and use the most suitable methodology.

1.4 Connection of supply chain management and business process management

The research of Lambert and Cooper (2000) explains how we came in the era of inter-network competition, where the small and individual businesses play very important role on the market, through their presence in the supply chains. The mutual cooperation and joint effort of all parts of the chain are dedicated to achieving superior competiveness and profit. Major corporations have come to a conclusion that in order to optimize the product flow, companies need to begin with implementing process approach. Additionally the authors give a very good description of the key supply chain processes, so the reader can understand their importance, recognize why they could be critical activities activates and think about future process improvements.

Figure 5. Olavarrieta and Ellinger's model
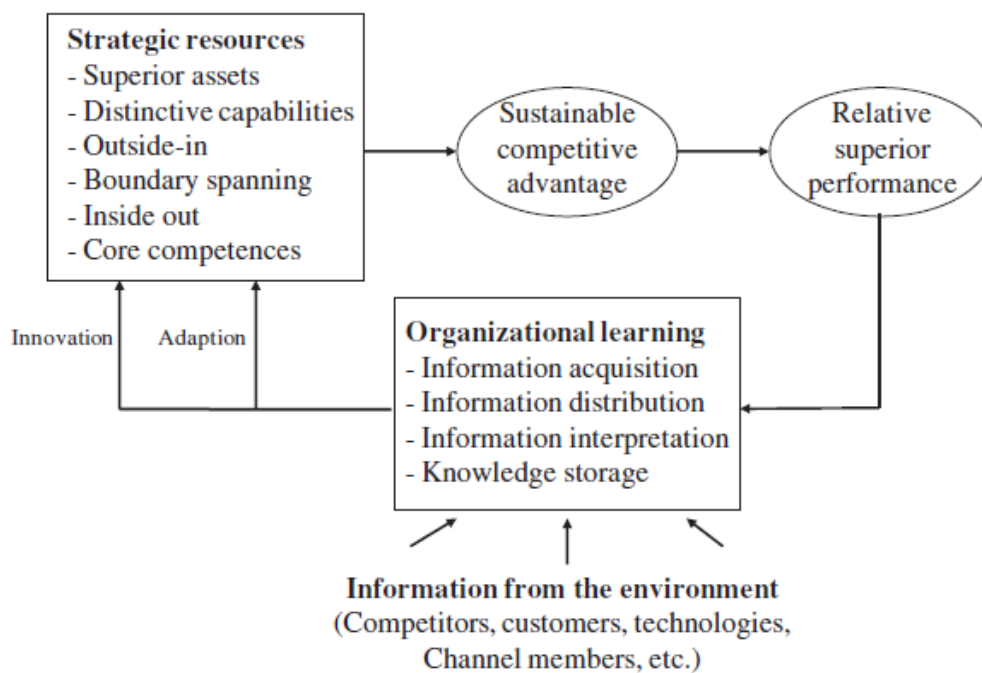
Source: Olavarrieta & Ellinger (1997).

To maintain a sustainable competitive advantage and achieve relative superior performance, a firm should focus on building strategic resources (Olavarrieta & Ellinger, 1997). Figure 5 presents the Olavarrieta and Ellinger's model, where we can see that strategic resources are consisted of superior assets, outside-in capabilities (market learning, technology monitoring, customer linking), boundary spanning capabilities (customer order fulfilment and new product development), inside out capabilities (logistics and

manufacturing capability) and core competences. To improve and update strategic resources, the process of "organizational learning" must be implemented. The main input for organizational learning is information provided through monitoring company's performance and environment.

To efficiently monitor and control a company's performance, first the implemented SCM in a company needs to be deeply investigated and understood. Understanding of SCM, starts with understanding every activity and inter-relationship, which leads to having the overview of the current state of company workflow. Later, good controlling and continuous process improvement can lead to operational excellence, or maybe even to operational innovation (Chen & Paulraj, 2004; Hammer, 2004). Operational excellence reduces errors, costs, and delays and ensures that the work is done as it was ought to be, without any fundamental changes and huge investments (Copacino, 1997).

Lambert, Stock, and Ellram (1998) postulate, that to successfully implement SCM, all companies within a supply chain must overcome their own functional silos and implement process approach.

The implementation of process approach and introduction of BPM, improve the effectiveness and efficiency of all business processes in an organization. The main goal is to define the processes, measure their performance and improve them. Experience shows that, a proper implementation results in reduction in costs, cycle times and quality improvement. What is more important, business process modelling provides mastery of the daily activities and ensures better knowledge, higher reliability and safety. Business implementation program must be well organized, follow the guidelines and cover all relevant aspects in an organization's development (Dayal, Eder, Koehler, & Reijers, 2009).

The paper of Jaklič, Trkman, Groznik, and Indihar Štemberger (2006) explains and provides a useful overview of most important SCM concepts and puts in focus the importance of BPM in supply chains. The traditional way of thinking about company performance divided on functional units, is replaced with process paradigm. Practical experience has shown that process paradigm brings more advantages, includes capabilities to discover critical business elements and gives a chance to optimize the company's workflow.

Agarwal, Shankar, and Tiwari (2007) mentions that non-integrated distribution processes and poor relationships with suppliers and customers lead to business failures in SCM. To overcome the fluctuations in demand and survive this era of time-based competition, supply chain must be able to meet customer demands for ever-shorter delivery times and to synchronize supply during peaks and troughs of the demand. The article talks about how technology can help and provide mechanisms for modelling the agility of supply chain. Making necessary improvements will also lead to competitive advantage in the marketplace. Improved information systems and communication technologies provide

opportunities for better coordination of activities across complex supply chains, such as the ones in oil and gas industry.

Processes that are recognized in most of the papers as manual, ad hoc, paper-intense, cause frustration for those who are responsible and involved, typically characterized with inconsistency and inefficiency are new customer intake, changes in customer requirements, contract management and procurement – which make them perfect candidates for BPM. Additionally, inventory level and logistics are taken as most common SCM issues that are demanding and require better control and coordination.

The main focus in research by Nakano, Akikawa, and Shimazu (2013) highlights the mechanisms of process integration in internal supply chains. In four case studies they analyze the process change in internal supply chains across different functions: production, logistics and sales. Therefore, the case studies analysis show how a focal firm builds and executes its dynamic capabilities on the basis of external environment situation, reviews opportunities for changes and modifies its operational routines. Case Pokka (beverage industry; products: canned coffees and concentrated lemon juices) explains how the company had problem with inventory level and implemented change in forecasting and planning process. The change was not successful, so, they decided to include changes in other departments as well. After continuous weekly review meetings focused on sales analysis, they decided to change their production strategy and produce only the products with high demand uncertainty, while products with low demand uncertainty were consigned to packers. In that way, they were able to respond fast to market fluctuations. In case Kao (household industry; products: laundry detergents, kitchen detergents, shampoos, and conditioners) a team including members from production, logistics, sales, purchasing, and information system departments, held regular meetings and discussed how to lower the inventory. They concluded that a better forecast and demand planning needed to be implemented. Using IT assets, a pilot test with six products was done in two ways: on the basis of the logistics department's forecast and the sales department's forecast. The results showed that the former approach was better, and later it was gradually implemented on all products.

So, from this literature review above, supported with arguments and case studies from the book "Designing and managing the supply chain: Concepts, strategies, and case studies." (Levi, Kaminsky, & Levi, 2003) it can be said that critical issues start from the basics of inventory management, purchasing functions, distributions system and logistics network design, to international concerns, demand instability and decisions support systems. Therefore, each company must investigate the essential processes internally and find a solution that will best fit its specific situation.

1.5 Business process management, modelling and improvement

The process concept originated from Fredrick Taylor in the early last century, followed with Business process Reengineering (BPR) by Davenport and promoted by Hammer and Champy in 1990s. After that, in mid and late 1990s, Enterpirse Resource Planning (ERP) was the main focus of the organizations. But ERP did not solve the organization's issues. In the end of 1990s and early 2000s, the organizations were concentrated on the importance of customer view and customer requirements, so Customer Relationship Management (CRM) took over "the stage". However, this concept wasn't enough and was a solution to only the front office-issues, while the root causes in the back-office processes were still "status-quo". That is how it came to BPM – management philospohy focused on organization's business processes and workflow.

In book "Business process management" by Jeston and Nelis (2014, p. 4), BPM is defined as:

"A management discipline focused on using business processes as a significant contributor to achieving an organization's objectives through improvement, ongoing performance management and governance of essential business processes. "

Below is another BPM definition that highlights customer importance:
A management approach that put focus on aligning and organizing all aspects in a company with the requirements of their customers, while still promoting business effectiveness and efficiency (vom Brocke & Rosemann, 2010).

BPM starts with explaining how things are done. Therefore, the core part in BPM is the process. The process is set of activities, interconnections and linked procedures that together realize a business objective by transforming a set of inputs into a specific output (good/service) for a final customer, by a combination of tools, methods and people. So, every process must have a start event – or a trigger, that shows the beginning of the process and end event, which indicates where a business process completes (Tenner & DeToro, 1997; Zhang, 2005).

The BPM refers to processes and organizing all essential components and subcomponents of processes. That means arranging the resources, technology, capabilities, applications, employees and their skills. Figure 6 presents main parts of business process management. The starting point is business process analyzing and modelling. Business process modeling is the activity of analytical representation or illustration of enterprise processes. It is very important to identify which are the essential processes that bring benefits to the company. The easiest way is to start thinking how exactly revenue is earned and where that revenue comes from. Anyway, every process needs to be well-understood in order to make the right decision if it is a core process or not (Bosilj-Vukšić, Indihar Štemberger, Jaklič, & Kovačič, 2002).

Figure 6. Business process management
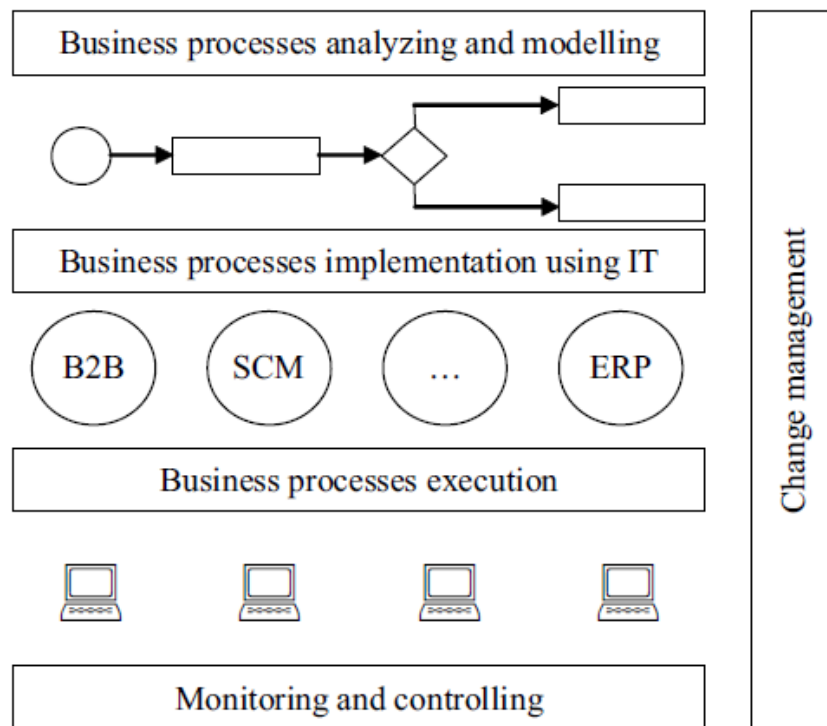
Source: Jaklič, Trkman, Groznik, & Indihar Štemberger (2006).

Different methods, techniques and tools can be used to model the business processes. For example Business Process Model and Notation (BPMN), Life-cycle Modelling Language (LML), Cognition enhanced Natural language Information Analysis Method (CogNIAM) or Extended Business Modelling Language (xBML). On Faculty of Economics, University of Ljubljana we studied BPMN technique and used IGrafix and Bizagi to represent models.

Process improvement sequence starts with eliminating the fear of change or understanding the processes. Next, business process modelling is used to remove work confusion, and that leads to simplification, where the wasted time and costs are eliminated. Finally there is the process of standardization, where decision is made about which alternative scenario is the most optimal and needs to be used in the future (Kovačič, 2004).

It is very important to get the processes right, before implementing any kind of automation or technology solutions. One of the most famous quotes by Bill Gates states that if you apply automation to an efficient operation, it will magnify the efficiency. While if you apply to inefficient operation, it will magnify the inefficiency.

Besides technology, another crucial factor to determine success in BPM are people (Figure 7). People need to be included into the development journey. In understanding the processes, they need to be consulted, listened to and communicated on regular basis. If they do not understand the processes and the reasons for changes, then the successful implementation will fail because of their confusion and bad performance. To achieve

mature level of processes, a company needs to work as a team and functional areas need to be properly integrated, with being aware of existence of cross-functional processes (Ostroff, 1999; Jeston & Nelis, 2014).

A company practicing a process discipline will benefit starting with employees' and customers' satisfaction. Empowerment of people and working interactively rather than independently between stages will result in creative thinking, flexible responding to new challenges and better managing of the risks. Implementation of information technology will help people to reach performance objectives and may reduce the number of process stages and lead-times (Persson & Olhager, 2002; Glaser, 2014).

Figure 7. The six core elements of BPM

Strategic Alignment	Governance	Methods	Information Technology	People	Culture	Factors
Process Improvement Planning	Process Management Decision Making	Process Design & Modelling	Process Design & Modelling	Process Skills & Expertise	Responsiveness to Process Change	
Strategy & Process Capability Linkage	Process Roles and Responsibilities	Process Implementation & Execution	Process Implementation & Execution	Process Management Knowledge	Process Values & Beliefs	
Enterprise Process Architecture	Process Metrics & Performance Linkage	Process Monitoring & Control	Process Monitoring & Control	Process Education	Process Attitudes & Behaviors	Capability Areas
Process Measures	Process Related Standards	Process Improvement & Innovation	Process Improvement & Innovation	Process Collaboration	Leadership Attention to Process	
Process Customers & Stakeholders	Process Management Compliance	Process Program & Project Management	Process Program & Project Management	Process Management Leaders	Process Management Social Networks	

Source: Rosemann & Brocke (2015).

With business process modelling we analyze the processes, which can lead to finding potential improvements in critical tasks and activities. Evaluation of different alternative scenarios for improvements is one of the driving factors of a business redesign process (Bosilj-Vukšić, Indihar Štemberger, Jaklič, & Kovačič, 2002).

In the process of developing a business case with using business process modelling and improvement, based on the read case studies and different sources of literature (Adesola & Baines, 2005; Mansar & Reijers, 2005; Palmer & Mooney, 2006), I found the following steps and guidelines points very beneficial. In most cases the core processes are main investigation area. Core processes are end-to-end, cross-functional processes that directly deliver value to external clients or intermediary. From another point of view, core process may be recognized as a process which is making up the value chain and where each step adds value to the preceding step. Additionally, it can be measured by its contribution to the

creation of the output and estimate the delivering value (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001; Panagacos, 2012).

After the decision about which process to model, the research process can start. First step is to analyze and present the current state as it is, before deciding what it should be like. Every process outlives the original design, because over time and through practice, things change. Begin with simply documenting how things are done today, write all steps in activities, frequency, time duration, and note potential opportunities, areas of improvements, obvious bottlenecks and issues. Next, examine each individual role in the process and identify the interdependencies between activities. Additionally, the system dependencies have crucial role and need to be identified which data is accessed, when and by whom. Then, review the flow and explain all the activities that happened before and after. Analyze the flow of information and see how the information transforms from one activity to another.

Thinking about potential areas for improvements, one must focus on aligning process improvements directly to organizations' objectives. One of the success criteria is to gain agility by providing access to data and visibility across the business. For example, how by changing this activity, I will help customer service managers to have faster approach to customer data, and that will improve overall the customer service and reduce time in workflow process (Chan & Chan, 2005). Ideas for imrpovments can appear also in previous steps, but having the big picture and analyzing the siumaltion more times, will help to discover the inefficiencies, design problems and potential application improvements. This can lead to automation and recognizing neccesary capabilities to realize the full potential. The main focus must not be to create a perfect process, but to imrove the quality of the data and to reduce time durations and costs. At the end, you should explain how the benefits of this business case can be applicable to other project areas.

1.6 Oil and Gas industry

The oil and gas industry produces the energy sources that we use in everyday life and provides job to more than 2 millions of people (Global oil and natural gas companies, n.d.). The oil and gas industry requires daily movement of large quantities on domestics and global markets. The oil and gas supply-chain is consisted by immense array of companies, complex operations and constant flow of materials.

The operations in oil and gas industry can be separated into two main stages (Colombano, 2015):

- Upstream – E&P (exploration and production) reefers to search for oil/gas fields or in other words seismic, geophysical and geological activities, then drilling of exploration wells, reservoir, production and facilities engineering.

- Downstream – starts with purifying of crude oil and refining it into different products: engine oil, diesel, LPG (liquefied petroleum gas), petrol, kerosene, jet fuel and other types of petrochemicals. Following is marketing or actually retail sale of the products and finally distribution to the customers.

Each segment in both stages can be individual entity or a unit of an integrated firm. Another segment is midstream, seen as supportive activity, which represents the transportation sector. Movement of oil and gas requires different ways of transportation, such as pipelines, barges, rails, oil tankers and trucks.

Key external factors affecting the industry are the determinants of oil prices, refining margins, world economic growth and demand for oil, geological prospects, government regulation and environmental policy, and capital costs. Key internal factors directly affecting oil and gas companies are reserve replacement ratios, finding costs, production profiles, earnings mix, return on investment, cash flow, debt ratios, and allocation of capital. Due to space limitations, I will provide short description of the factors relevant for the case study of the thesis.

- Determinants of Oil Prices – OPEC (The Organization of the Petroleum Exporting Countries) has the most significant influence on oil prices. OPEC is an intergovernmental organization formed to ensure stabilization on market and respond to activities of seven large international oil companies – "Seven Sisters". Founders of the organization are Islamic Republic of Iran, Iraq, Kuwait, Saudi Arabia and Venezuela, and later joined by other countries: Qatar, Indonesia, Libya, the United Arab Emirates, Algeria, Nigeria, Ecuador, Gabon, Angola and Equatorial Guinea (Organization of the Petroleum Exporting Countries, n.d.). Fluctuations in demand on O&G market and in the supply by non-OPEC countries also affect the prices.
- Economic growth and demand for oil and gas - In the report "Facing the hard truths about energy" published by the national petroleum council (NPC), is forecasted that the global demand for energy will increase 50 %-60 % by 2030. The demand growth will be result from the increase of world population and higher standard of living in some developing countries. An important problem that threatens this industry are the environmental concerns. Also, the report emphasizes that the industry will need technology improvements or other potential solutions to reduce the $CO2$ emissions (Truths, 2007).
- Government Regulation and Environmental Policy – each country has different orientation approach about O&G industry. The different regulations and policy have influence on the companies, starting from taxes, different controls and regulations about the production, inspections, warehouses, investments, quality of the good, environment pollution etc.
- Return on Investment – ROI is the percentage return on your investment, considering the amount of capital put as a risk. For example, if the amount of capital is 100,000$, and during the project the earned money is 150,000$, the ROI is 50 %. Investments in O&G industry are very risky (How To Select The Best ROI Deal, 2018). The average

ROI in O&G is -2,56 % (Oil And Gas Production Industry, Return On Investment Statistics, n.d.). Different occasions and events, crises, environmental and political factors are only few in the huge area of reasons that provoke the instability.

- Debt Ratios - Debt Ratio is the financial ratio that presents the percentage of a company's assets that are provided via debt and measures the extent of a company's leverage. Debt ratios are important in valuation of the companies' efficiency in working and planning financial assets (Hovakimian, Opler, & Titman, 2001).
- Rapid pace of changes in various aspects of products, competitors and technology result in dynamic supply chain era. Additionally the constantly changing prices of oil and gas, marginal oilfields, and specific locations force the oil and gas industry to find better solution to overcome these challenges (Iyer, 2011; Clifford Defee & Fugate, 2010).

In one part of the paper "Implementing supply chain management in a firm: issues and remedies", authors place focus on petroleum SCM and oil and gas industry. The petroleum supply chain starts with the crude supplier, then company processing the crude oil, the storage installations, the retail outlets and ends with the consumer. All of these members have important role in the chain and influence on the final output. Because of that, improvement in efficiency alone is not enough for the whole chain. However, one of them is enough to start and generate the idea of better cooperation and information sharing. Besides improved efficiency, increase in sales, gaining competitive advantage and creating shareholder value, are also results of well-organized SCM. The paper also states that one of the major areas that can affect material flow are logistics and information technology (Varma, Wadhwa, & Deshmukh, 2006).

In the paper "Supply-Chain Management Issues In The Oil And Gas Industry", Chima and Hills (2007) present the major supply-chain links in the oil and gas industry (Exploration → Production → Refining → Marketing → Consumer) and provides explanation about three main point of the management decisions in the chain: configuration, coordination and improvement.

"Configuration involves the following issues:

- what product-service bundle to produce;
- what portions of the bundle to produce in house and what portion to purchase from others;
- facility capacity;
- location of facilities;
- type of technology to adapt;
- handling communications between suppliers and customers; and
- standards expected of customers and suppliers.

Coordination from the perspective of each company involves the following issues:

- ensuring supplier effectiveness in cost, timeliness and quality;
- setting appropriate targets for inventory, capacity, and lead time;
- monitoring demand and supply conditions; and
- communicating market and performance results to customers and suppliers." (Chima & Hills, 2007, p. 29)

Due to the demand variability, improvement is directly connected with continuous evaluation and requires changes over time. All members along the chain need to share information and focus on reducing lead-times, therefore the whole chain can operate more coherently and reduce costs (Chima & Hills, 2007).

Wright (1996) talks about the key trends and factors in procurement. In particular, his area of research is the UK North Sea oil and gas industry. He mentions the increased contractors' risk, cultural changes, project timescales, product-oriented solutions and market polarization. His thinking is mostly devoted to cost effectiveness with regards to operational management. Mohammad and Price (2004) explain how the turbulent demand in oil and gas industry force supply chain managers to seek for better solutions and new procurement strategies. The article discusses the challenges on procurement in oil and gas industry and developing of new strategies. Longo (2011) mentions that the information management related to demand is characterized by critical issues derived by market needs, industrial processes (ex. refineries repairs) and delivery schedules.

To sum up, supply chain management in oil and gas industry includes a lot of difficult and complex tasks, as a result of the large size of the supply network dispersed over distant locations, various and long-lasting downstream and upstream activities and inherent uncertainty. All levels of decisions: strategic, tactical and operational are typical for this SCM. The supply chain network consists of different entities across multiple countries. Any disruptions anywhere on a global level, can trigger adverse effects in profit, quality of products, efficiency and customer satisfaction of the whole supply chain network. The adverse effects may happen because of rapid swings in availability and prices, demand, distribution, political climate or uncertainty in supply of the crude material (Randol, 1993).

2 RESEARCH METHODOLOGY

2.1 Research Design and Approach

To answer the main research questions for the empirical part of this study, case study was chosen as a research approach. The benefit of this type of approach is that it can provide information from observed empirical evidence. The top management reviewed and

approved the execution of the case study and the research took a place at the company's administrative office location. In order to gain insight in the business processes of the company, based on available literature on the methodology of case study research (Barratt, Choi, and Li, 2011, Tsikriktsis, Lanzolla, & Frohlich, 2002; Yin, 1994), the case study was conducted in the following manner.

Firstly, an introduction workshop with the relevant employees and top management was conducted. The top management selected the participants at the introduction workshop. At the workshop, I presented the general idea of the research and goal of the project. The introduction workshop helped the participants to achieve a greater understanding of the project plan and therefore a more holistic approach to the BPM initiative. The first task was to create a model with an overview of all the company's processes. The model involved evaluation of the processes and selection of the ones that have the greatest impact on the company's strategies and goals. The result led to create a more accurate hierarchy and recognize the core business processes. The top management decided that the processes covered in the following in-depth interviews and workshops, to be procurement and selling process, with supportive activities: demand planning and warehouse capacity planning. The functions represented by those who needed to be interviewed included the top management, purchase, accounting, finance, logistics and warehouse department. At the end of the workshop, a plan for the project was created and a time schedule for in-depth interviews was decided.

Data was collected in between May and December 2017 using multiple inquiries:

- in depth interviews;
- workshops;
- short review meetings;
- work observation; access to confidential material and documentation; and
- semi-structured interviews with employees (who did not participated in the workshops), customers and suppliers.

In-depth interviews: Ten in depth interviews helped to expand the understanding of process activities and dependences through more detailed answers and from each individual point of view. The in-depth interviews were conducted in person and in Macedonian language. An interview guideline was developed and all interviews had the same protocol. Questionnaires were sent to the employees beforehand to enable them to acquire necessary knowledge about the topics. Interview durations were different, but approximately two hours each. The in-depth interviews were guided primarily by five key points: (1) employee's activities and responsibilities in procurement and selling processes, (2) the duration of employee's work obligations, (3) communications and connections with other departments, (4) how the employee sees the organization engaged in a BPM initiative, (5) opportunities and obstacles for future improvements and (6) past changes and initiatives for IT. All in-depth interviews were recorded and transcribed as soon as

possible. Then the transcriptions were sent to employees for review and necessary modification.

To get a better understating needed for modelling the core processes, besides the interviews, I also conducted work observation. I observed the work of the software that was used for managing and controlling process related data, activities and information exchange between departments. It was discussed what IT solutions the company had implemented to ease the work and what practical benefits the employees have recognized. The employees shared their opinions openly. Top management enabled broad access to confidential material and documentation.

During the whole research, I did eight semi-structured interviews with the rest of the employees in the company, just to have a better view of the process workflow.

Workshops: Seven workshops helped to understand the current state of the company workflow, helped in the business process modelling and initiated interactive discussions between employees. After the third workshop, the employees wanted to contribute to the research and suggested meaningful topics and interesting debates for the following workshops. Additionally, several workshops were taken, to revise the activities that were more problematic and difficult to understand. The workshops allowed the participants to discuss points between themselves and to challenge each other's views. It was determined which workshops needed top management attention and participation. Surprisingly, the participants in the workshops discussions also stressed that many problems existed due to lack of adequate communication between the departments. An important issue for further research is to explore the reasons for departments not sharing related information. In general, the both process models requested human judgment, employees' experience and included complex decision-making activities.

The collected data from the interviews and workshops was the base for modelling the business processes. I used Bizagi tool for the preparation of business process models. The tool is user friendly (Scholtz, Calitz, & Snyman, 2013) and has been used in modelling processes during the execution of faculty subject – Business Process Management. The picture of the model, followed by description of the qualitative data is in Figures 8 and 9.

Following the Yin (1994) advice for validity, the best is to return the case study output to the participants for verification. Therefore, the business process modeling procedure was divided into two phases. The aims of the first phase were to obtain an in-depth knowledge of the employees' practices in their department and to explore the connections between departments. Whereas in the second phase, the process models were represented as draft version at workshops and through discussion were improved and defined the final version of the model. Employees were pleased to identify the activities and opportunities for improvements. Exploring the process models led to better understanding of inter-firm behavior. I conducted a total of seven workshops with seven to eight members each. Each

workshop lasted approximately ninety minutes. All workshops were tape recorded, then transcribed and summarized for analysis.

Overall, following the example in study by Rohloff, M. (2009), the debates in workshops were centered on process enablers and supportive environment:

Process enablers:

- Design: how was the process executed?
- Performers: the knowledge and skills of the employees involved
- Owner: the top management
- Infrastructure: the systems that support the execution of the process
- Metrics: the measurements used to track the performance of the process

Supportive environment:

- Culture: Emphasis on a customer and supplier focus, teamwork, and willingness to change
- Expertise: Skills and methodology needed for process redesign

Review meetings with top management were held on a regular basis. The reviews were short, around 15-30minutes, just to discuss some misunderstandings and solve possible further issues for analysis.

Each of the two processes included relevant members outside the company – customers and suppliers. This created the need of additional semi-structured interviews with suppliers and customers. Seven semi-structured telephone interviews with customers and three semi-structured Skype calls with suppliers were conducted. Their responses helped me to improve the process view and determine the activities that could lead to better supplier/customer relationship.

To sum up, all inquiries contributed to new and creative insights. The research approach provided a good understanding of the two crucial processes and additionally explored the relationships between employees. It was time intensive, but the output was worth it and based on the findings from the discussions, it is possible to suggest future improvements that would not just ease the work of this processes, but the overall operations of the studied company.

2.2 General information about the company

DTUT Marija Treid DOO import-export was established in 1992 as a company with a limited liability with basic business activity - transport of goods in international market. The two founders of this company are still the top management. The company main business focus has been changing over the years. Until 1998 the company main business activity was transport of goods in international market, but after 1998 it started to deal with transport of oil/petroleum derivatives. In 2000, the company switched their main focus on procurement and trading with liquid petroleum gas (LPG). In 2007, the state passed a law that the companies needed a trade license to continue the work, and DTUT Marija Treid immediately applied and received the trade license for LPG retail and wholesale. The trade license is a proof that the company meets all conditions and is legal and capable of trading with LPG.

At the moment, the company's main focus is working with wholesale of liquefied petroleum gas, import and export of liquefied petroleum gas. On the second level of priorities is the management and work of the petrol and gas station that the company owns in Skopje.

Employees from the top management, accounting, finance, purchase and logistic departments work at the head office in Veles.

The company has established two branches:

- The first subsidiary petrol station is located in Skopje where 11 workers are employed and one manager who is responsible for controlling the workflow and reporting to top management.
- The warehouse for liquid petroleum gas is located in Veles, where eight workers are employed and one manager. He is also safety adviser for the transport of hazardous materials, responsible for controlling the workflow and reporting to top management.

The company owns transport vehicles. Transport is one of the major contributors to profitable deals of the company. In that way, a company is more flexible for making the plan of obtaining the good and transportation costs are lower.

The company has employed 35 vehicle drivers.

The company owns 37 trucks (Scania, Volvo, Man) and 35 tanks (Vps, Stokota, Kardesler) for transportation of LPG with capacity of 20 tones, which are used for international transport. For transport of LPG in the country, the company owns six solo-vehicles (Man, Atego, Mercedes): three with capacity of 10 tones and three with capacity of 7 tones.

2.3 Enterprise Infrastructure Evaluation

The company owns the basic infrastructure needed for process workflow. They own the computers, printers, needed memory and storage and the software. The computers of the employees at the administrative office are network connected and they share one folder "Public documents" for files that contains information important for all functions and departments. In the company there is no IT Office or department, which is responsible for the IT support. In 2007 the company started using Argus Media. Later, in 2011, the company started to use two software applications Frotcom and Collab.

Argus Media
In 2007, one of the top managers was attending a conference and found out about the benefits of Argus Media. The company invested in Argus Media membership and now they use Argus Media as a provider for the most important information about prices, fluctuations, consultancy services, events and conferences for the LPG and also for crude, oil products and natural gas. Companies, governments and international agencies all around the world use Argus data for analysis and planning purposes. Argus additionally provides the same data for electricity, coal, emission, petrochemical, metals, bioenergy and transportation industries.

Frotcom
Frotcom is a professional tool for Global Positioning System (GPS) for vehicle tracking and fleet management (Radinski & Mileva, 2015) that allows communication with truck drivers and monitor driving behavior. It also includes alerts and reports. The reason why the top management decided to invest in Frotcom is because this powerful tool would help the company to improve productivity, improve customer services and have a full control on the routes. Another reason is because most of their partners, especially the international companies, were already using this kind of tool. Moreover, their customer/partner from Macedonia implemented a condition for all coworkers to install the GPS following system. The logistics department has the responsibility to use Frotcom for following the routes and inform the customers for tucks' current location on the route. Additionally, the top management is using Frotcom to control the workflow and employees behavior.

Collab
In 2011 the Republic of Macedonia implemented the process of tax administration (fiscalization) on the petrol/gas stations. The process of tax administration is the process of placing fiscal device for monitoring tax pay in accordance with the law. In that way, the tax authorities control tax payment through the device installed on petrol/gas station. At that time, all of the companies owning petrol/gas stations had to accept the process of tax administration and pay the costs to implement assets and software that would support this kind of process. The top management chose the company Accent for implementing software to support the tax administration process. The company Accent offered the Collab – ERP software, which besides supporting the tax administration, could be implemented on other functions in the company workflow, as well. The top management reviewed the

benefits of the software offer for overall workflow in the company and made decision to stop outsourcing accounting functions. The company hired two employees for the accounting department that were trained to use the Collab software, by the IT representatives from the company Accent. The software is web based, so the company Accent implemented a server to store the data and the employees from the company use web browser to access the data. With the same server, the software is connected on the gas station and in the offices of the company. The software is used for processing the information, from receiving the goods on the gas station and complete material and financial operations. Only the top management, the employees on the gas station, the head of the gas station and the employees from accounting and finance department were trained to use the Collab software and have access to the software.

3 RESULTS

3.1 Business process modelling

3.1.1 General description of business processes: procurement and selling

As mentioned above, after receiving the license, the company's main focus and profitable income comes from trading with LPG. The trading with LPG contains two core processes, which are dependent on each other (Figure 8).

For better understanding of the process flow, a short general description is provided, followed by detailed description of each process and relevant roles and activities. In reality, both processes are happening at the same time, but the outcome of the selling process is the trigger to start the procurement process.

The company follows the situation on the stock market daily and pays attention to the price fluctuations. The procurement process flow starts with decision of the top management to make a demand order based on the monthly demand plan, then search and decide for supplier, make an agreement and sign the contract. Then the execution of transport and obtaining of goods starts. Goods are received at the warehouse and the process ends when the payment is done. When the goods are received in the warehouse, the selling process flow starts. Based on customer orders an outbound shipment plan is done, then next is the transportation of goods to customers (and gas station), and payment is received.

Figure 8. Flow of two dependent processes - procurement and selling

Source: Own work.

In the Figure 8 the activities of procurement process are colored green, while the activities of the selling process are colored blue. The Demand planning and the Warehouse capacity squares are representing the supportive activities for both processes and are explained in the following chapters.

3.1.2 Relevant roles for the business processes: procurement and selling

Due to the fact, that the company offers different kinds of services, not all of the company's employees are involved in procurement and selling processes. In Table 1 are listed the relevant roles for both processes and their obligations are explained.

Table 1. Relevant roles for business processes

Department	No. of employees	Obligations
Top management		Both top managers: can approve payment and sign invoices; make the demand plan and make decisions about prices, to apply on tender and to invest.
	1	Focused on searching for new suppliers, representing the company on business meetings, networking, business trips for improving supplier/customer relationships, attending events, seminars.
	1	Focused on controlling the workflow, controlling the legal documents, responsible for controlling the bank accounts and helps the logistics department in making the inbound/outbound shipment plan.
Logistics	1	Responsible for following the trucks and drivers, controlling the documents needed for the transport vehicles, receiving the Goods Received Note (GRN) document, control the information on documents.
Purchasing	2	Responsible for preparing the documents for top management to sign, prepare list of suppliers, send signed contracts and record the received documents.
Accounting	2	Responsible for recording the inputs for system Collab, financial checking of the invoices, financial calculations and financial reports.
Finance	2	Responsible for recording the inputs for system Collab, responsible for controlling the financial payments and financial documents, responsible for arranging cash for the truck drivers for international and domestic routes.
Warehouse	1 head	Responsible for control of received goods, control of situation and capacity in the warehouse, and gives instructions for delivery dynamics.
	8	Responsible for receiving the goods; loading/unloading the trucks.
Truck drivers	35	Responsible for execution of the routes.

Source: Own work.

3.1.3 Warehouse capacity and activities

In warehouse capacity there is LPG storage asset of 600 cubic meter and five LPG storage tanks with 100 cubic m. That is capacity of 1100 cubic m or 550 tons of LPG. In the

warehouse, maximum two trucks can be unloaded at the same time. The warehouse has enough space for all trucks to be parked there at the same time.

The LPG is specific and dangerous good and it is very important to be controlled by the employees. On the assets used for storage of LPG, there are safety valves and with them, the pressure can be regulated. If the pressure is above 18 bars, the employees open safety valves and regulate the pressure. In this case, a little quantity of the LPG is lost. The high temperatures have an impact on the goods. For example when temperature is 35 to 40 degrees, the goods need to be continuously monitored. In winter, there are no problems.

The top management decided to sell the standard mix of LPG as following: during summer season 30 % propane and 70 % butane, during winter season 40 % propane and 60 % butane. For extremely low temperatures, they are using 50 %-50 % mix. If some customer wants to order different mix and the top management approves that, then the logistics department informs the warehouse employees to load the tanks with requested mix.

Duration for unloading tanks of 20 tones is 40 to 50 minutes. In summer season it is faster compared to winter, because of the temperature impact. Duration for loading tanks of 10 tones lasts 20 to 25 minutes.

The quantity is measured at loading and unloading goods. First, the tank is measured empty (without loaded quantity), then the tank is loaded and is measured again with the loaded quantity. The difference between unloaded and loaded tank is the quantity of the LPG. For unloading is vice versa - First the tank is measured with loaded quantity, then the tank is unloaded and is measured again empty (without loaded quantity). Due to different assets for measurement, allowed exceptions in quantities is max 0.5 % of the quantity.

3.1.4 Demand planning

The process of demand planning is made by the top management. Based on history data the top management reviews the past trend of demand orders from customers and plans the needed quantity. History data that affects the demand planning is data from the past months in current year and data for the same month and season from the previous years. The demand fluctuations appear between seasons rather than months. This process is made before the end of the month. An opportunity for an extraordinary sale may happen during the month (e.g. a request to participate on a tender) and then the top management must review the demand plan once again and decide if they are capable to participate or not. The most important constraint in demand planning is the warehouse capacity. There is an option to rent a warehouse, but the deal with the supplier must be profitable enough to cover the costs for renting. Time limitation of organizing new supply when stock out situation appears is also considered as a constraint. This situation becomes a serious issue, because the company is not able to organize new supply quickly and this can result in losing the customers. Another constraint in demand planning is the high amount of money

that needs to be paid for the goods. That means the finance assets need to be forecasted and planned in advance.

The company's main suppliers are located in Russia. In average, a route to Russia and back lasts ten days. Approximately the route is as following: three days - driving to Russia, one day - loading of goods and export customs procedure, four days - returning back, one day – import customs procedure and one day - pause to rest. Based on the average of ten days, the month is divided, 30days/10days is equal on three times a month a truck can execute a complete route to Russia. The income from selling the goods is used for payment of the goods.

When the prices are increasing, the company tries to keep maximum of the warehouse capacity. That is logical, because the company tries to sell less and wait until the prices on stock market start to decrease. When the prices on the stock market are decreasing, the company keeps the warehouse capacity on minimum. Minimum capacity in warehouse is regulated by the state law and must be the average daily sales of goods in the previous five days. For example, if the company sold 300 tons in previous five days, the warehouse capacity that day needs to be minimum 60 tons. In the demand planning the top management forecast the average quantity based on the average of the quantity sold in the previous month. Therefore, for safety reasons, it always planned plus 5 to 10 % above the minimum of warehouse capacity. The warehouse capacity is measured every day and is recorded to keep track. So when the logistics department accepts the orders and plans the delivery dynamics, it must be careful and take into account the minimum warehouse capacity.

3.1.5 Procurement process

The procurement process is one of the core processes in this company. In the following section the process will be explained step by step, from identification of need for ordering the good to receiving the good and payment. It is long process that lasts around 10-15 days and contains sub processes. Some of the sub processes that are more important are described more detailed. The numbers in brackets refer to the numbers on activities on Figure 9. You can find a better view of the Figure 9 in Appendices, page 2, Figure 14.

Identification of Need/Requirement (1)
Top management based on the plan for ordering monthly quantities of LPG recognizes the need of ordering goods. This process starts one week before the end of the month. The need of ordering goods may also appear unplanned during the month. The reasons may be large increase of demanded quantity by customers, rapid decrease of the price of the goods or request to participate on tender procedure. In that situation, additional quantity of LPG needs to be ordered to meet customers' needs.

Specific Need/Requirement

The oil and gas industry has specific requirements for ordering the goods. Before the order is done, a list of things needs to be checked (2): vehicles available to transport the goods, conditions and current situation in warehouse, available truck drivers and available legal documents. Documents needed for the truck-driver are passport, driving license, international driving license and ADR certificate (drivers of vehicles carrying dangerous goods are required to hold a special vocational certificate of training). Documents needed for the truck and tank separately are traffic license, green card, approval document by company for driving the truck and ADR certificate.

Identification of Suppliers (3)

The company has different kind of relationships with its suppliers. With the suppliers that have a longer cooperating relationship, the company is making annual contracts. For each monthly order an Annex is signed between the company and the already contracted supplier. The monthly quantity, price and delivery dynamics are determined. The suppliers that have been contracted in this way are prioritized in the process of selecting a supplier. On the other hand, the top management makes a decision for selection of supplier informing though Argus media, where they find information about the LPG market. Argus provides information for international LPG prices each day, including the key European indexes and benchmarks. Based on information about the prices, top management selects suppliers.

Sending a request for quotation (4, 5, 6)

Based on the list decided by the top management, the purchase department sends a request for quotation (RFQ) to the suppliers. In the RFQ they require information for the available quantity, quality specifications and price of the goods. Additionally they can be asked for information if they already have the quantity in the warehouse or they are getting it from another supplier. Therefore, if the supplier does not have the goods in the warehouse at that moment, it needs to be discussed how much time they have planned to receive the goods. If the time plan matches for both companies, they can be taken as a potential supplier. Another scenario is if the goods are taken directly from refinery, the company needs to ask about conditions that need to be fulfilled to have access to the refinery. This is because some refineries request that the truck drivers have special working clothes and special conditions for the truck (for example to be marked with some signs). Information about the working time of the refinery is also required, because the truck drivers must be informed when they will have access to load the goods at the refinery. The due date for response of three days is mentioned in the RFQ (7). After receiving the responses, the department collects them and sends to the top management for review (8).

Negotiation (10)

This depends on the need, the price, the quality of goods, time needed for the delivery and as mentioned above the conditions for accessing to the warehouse/refinery. This part is done by the top management and can last max three days.

Selection of the Supplier (9, 11)
The decision is made by the top management and the documents required for completing the whole process of delivery of goods, need to be prepared by the purchasing department.

Preparing and sending the purchase order (12)
The purchase order is the contract made between the two companies - the company that is ordering the goods and the supplier. The contract is made by the supplier and is received by e-mail (13). The contract is provided in native language of both companies that need to sign the contract, plus in English. The purchase order/contract outlines the price, quality specifications, terms and conditions of the product and any other additional obligations. It needs to be reviewed and signed by the top management and then the purchasing department sends it by e-mail to the supplier (14).

After that, the original contract is received by regular mail in three copies and needs to be signed and returned to the supplier by regular mail (15). The companies do not have to wait to receive the original contract by regular mail to start the process of delivery of goods.
The Russian market has additional legal documents that need to be sent with the purchase order. The country requires trucks to have special approval document to drive in Russia. This document needs to be issued every year. These documents are made for 30 trucks every year, because the company orders more than half of the monthly quantity from Russia. Therefore, when the purchasing department sends the purchase order, they need to provide a list of vehicles that are going to be used for transport of the goods.

Planning the route (16, 17)
The suppliers suggest the routes and the best choice for country entrance and exit. For Russia, the supplier provides information where exactly the entrance and exit of the country must be and on which date. That is very important because of the customs procedure on the borders. Then the logistics department decides where the truck driver will make the refuel. The final route for driving is made by the logistics department based on the requirements of the suppliers and then the top management makes a review (18, 19). There may be some small changes suggested by the top management and the final plan for the route is defined (20).

The company is using the application Frotcom for GPS following of the trucks that shows truck's exact location and the speed of driving. For routes that are chosen for the first time, the logistics department calculates the costs based on information on Internet for pay tolls and vignette, refilling, parking, costs by customs terminals and daily subsistence allowance (DSA – paid as a flat-rate amount). For the routes that have already been driven, the logistics department makes the calculation of costs based on history data. Based on this costs logistics department prepares certain amount of money that the finance department gives to the truck-driver before he starts the route. The amount of money is reviewed and approved by the top management. The logistics department is responsible for preparing all the documents needed for execution of the route (21).

Figure 9. Procurement process model
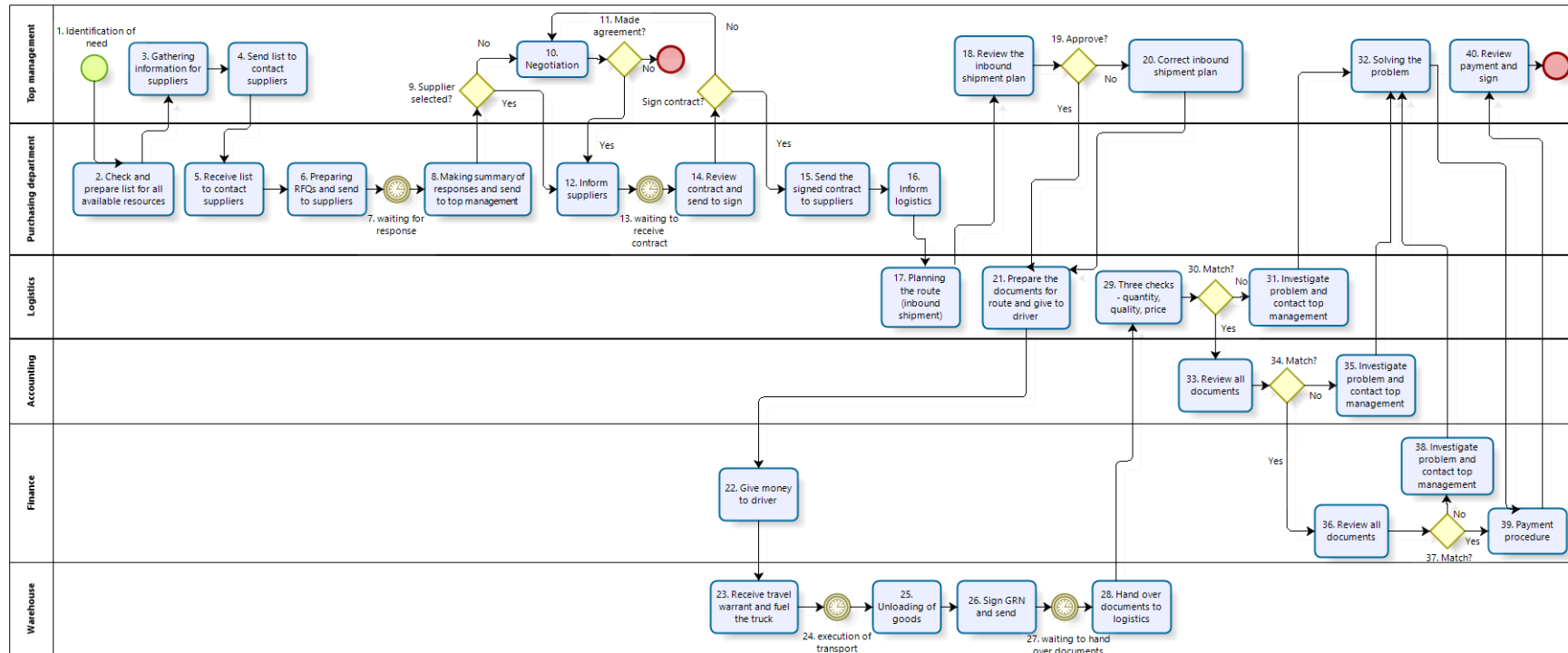
Source: Own work

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The driver is informed about the planned route and the date for driving by logistics department. On that day, the truck-driver comes to the office and takes the travel warrant and CMR (21), gives information about the costs for the whole route and takes the documents needed for the route. One part of the money is given in cash and the other is on credit card (22). The reason for splitting the money in cash and credit card is because they have situations in the past when the truck-drivers were robbed. In the warehouse department, employees fuel the truck based on the information from the travel warrant (23).

Execution of the transport (24)

During the whole transport the truck is followed on Frotcom tool and the truck-driver is contacted for situation on roads and at borders. The suppliers are also informed of the location of the truck, so they can plan the arriving and loading of goods. These activities are done by the logistics department. At the warehouse/refinery after loading the goods, the truck-driver receives cargo bill for loaded goods and this document needs to be signed by both sides. Additionally the truck driver also receives the invoice and the customs declaration. There are two types of invoice. If the goods are taken directly from the supplier is one type of invoice. If the goods are taken from intermediary firm, the driver travels with the invoice from the supplier and applies with the invoice from the intermediary firm on customs procedure at home-country border. The truck-driver informs the company for the successfully loaded goods and starts the route for returning.

The customs procedure can be local or at the border. The local customs procedure lasts one hour, while at the border lasts two-three hours. The time can be reduced if the company decides to custom all trucks locally, but in such a case, the company needs to provide a warranty to Macedonia with a value of three times the customs price. From customs procedure the driver only receives customs approval to leave the terminal and the documents from the customs procedure that contain information about the quantity, specifications of the goods and the costs are sent by regular mail to the company.

Goods receipt (25)

At the warehouse, the goods are unloaded. The tank is measured full (before unloading the goods) and empty (after unloading the goods). The difference between full and empty truck shows the quantity of goods and is recorded by the employee in the warehouse, who executes the unloading of the goods. The man responsible at the warehouse signs that the goods are received, signs the specifications and later hands over the document to the logistics department (26, 27, 28).

Three-way's match of the documents (29-38)

Three-way match refers to the three documents involved:

- Supplier's invoice, which was received and will become part of the company's accounts documents that needs to be paid.
- Purchase order/contract that was signed by the top management.

- Received GRN that was issued and signed at the warehouse.

That means that the price, the quantity and the quality of the goods must be the same on all three documents.

First step - to check if the quantity matches – (truck driver's responsibility):

At the office the drivers personally enclose the documents for the vehicle, customs approval, CRM, GRN and the receipts for the costs made on the route. The truck driver is responsible for the quantity of the goods, while the supplier is responsible for the quality of the goods. The truck driver is also responsible for taking care of the good while driving. On the truck, there is a logger that is measuring the bars in the tank. When the driver makes pauses, he must check the bars written on the logger. If the logger is near the upper border, he needs to turn on the safety valves and reach the normal bar pressure. In this way, a small amount of quantity of the goods is lost.

Second step - to check if the quality matches – (supplier's responsibility):

For the quality of the goods, the company sends samples to authorized laboratories. The samples are taken at the moment when the goods are loaded in the tank. The response from laboratories is maximum in three days. If the quality does not match, they contact the supplier and provide results from the laboratory. Then they make a compromise. For example, to send the goods with better quality next time, in that way they will compensate for the current quality and achieve the level of quality needed; or to compensate the difference in money value. That lasts about a day.

Third step - to check the purchasing price:

The documents from customs procedure are received by regular mail usually in two to four days. Then it is checked if the inputs match with the inputs from the warehouse and the invoice from the supplier.

The logistics department (29) reviews all documents and makes the three-way check and then once more the accounting (33) and finance department (36) make a financial and mathematical check.

Recording
The accounting department enter the invoice issued by supplier in the system Collab. The costs for the route are calculated.

Average procurement price calculation
In the accounting department, the employees take a record of the quantity received (based on the GRN from the warehouse), costs made during the execution of the route and the price for that quantity (based on the contract between the company and the supplier). Based

on all of this information the procurement costs are defined. Procurement costs are: purchase price, transport costs, DSA, truck-drivers earnings, excise (a percentage levied on manufacture, sale, or use of locally produced goods such as LPG, alcoholic drinks or tobacco products), costs for state reserves, customs procedure costs, sales tax and amortization. For Non-EU countries, the custom cost is 2 % of the price of the good, and for trading with EU countries there is no customs costs.

From the goods received that day, based on the quantity, the purchase price and the procurement costs, an average procurement price is calculated. The average procurement price is calculated every day (if there were goods received at the warehouse) and once a month. Therefore, there is daily average procurement price and monthly average procurement price. The calculation of the average procurement price of the goods is very important because it influences the selling price and the earned profit.

Due to the time of five days for delivering the goods, the procurement price from Russian suppliers is differently calculated. To be fair for both sides, the companies made an agreement to take average of supplier price for five days. Therefore, on the day when the goods are loaded, the supplier's price from that day is written on the document, but the final price is written in the invoice and is taken as average of the supplier's price for five days.

Payment to supplier (39)
The payment is done two to four days after receiving the goods and procedure for matching the documents. The finance department is responsible for the whole process of payment. The finance department first contacts all the banks, gathers information of the exchange rates and SWIFT costs, and based on the gathered information, decides in which bank the payment will be done. If the finance department could not decide by themselves, they contact the top management. The final documents for payment must be reviewed and singed by the top management (40).

3.1.6 Selling process

The procurement process is followed by the selling process (shown in Figure 10). The company does not put so much effort in finding customers because they are recognizable for the low prices and they have a lot of regular customers. To make a profitable income, the company only needs to keep their good quality and keep their loyal customers. The numbers in brackets refer to the numbers on activities in Figure 10. You can find a better view of the Figure 9 in Appendices, page 3, Figure 15.

Pricing strategy
Process of decision making about the selling price for each customer is an activity that is done by the top management. The top management decides about the prices based on two different types of information. The first type of information is easily available and is about the prices on stock market, prices of the company's competitors and average procurement

price. On the other hand, the second type is the customer's behavior information and the data is more complicated to collect and analyze.
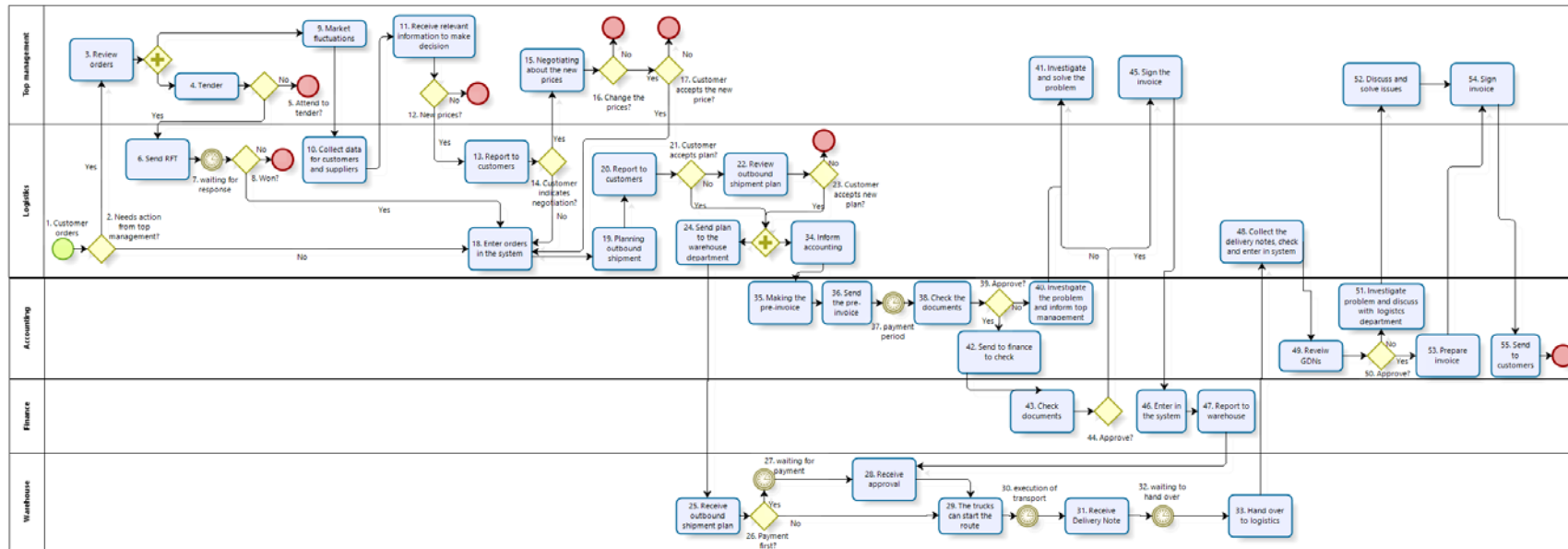
The price on the stock market is checked daily. If the prices on the market go up or down that affects not only the selling process, but also the procurement process. If the change in price on the market is small, than the top management does not change the price for the final customer. It is better to keep the same level of the price, because that influences also the customers' behavior as well. If the price changes very frequently, the customers will also react on the fluctuations and may feel insecure to order in future.

The next step is to check the prices of the competition. The top management observes the competitors reactions to fluctuations on the stock market. The company's goal is to have lower prices than the competition with the better or same quality of the goods. Therefore, if the competitors do not react to fluctuations and keep the same price, the company will keep the same price too. If they lower or increase the price, the company will make the same step, but always keep lower prices than competitors. There were situations when competitors lowered the price so much that the company needed to set prices under their minimum and work with loss for some period. In order to have lower prices than competitors, the company's strategy is to be focused on long-term relationships with suppliers and customers and invest time and effort to find suppliers that offer good quality and low prices.

The third step is the calculation of the average procurement price that is the base for making the selling price and calculating the profitable income. The profit that will be realized is the selling price minus the transport costs, sales tax (18 %) and an average procurement price, times quantity. The company owns the transport vehicles, which is a big advantage in such an industry. That means that the customers do not need to organize transport, because the company provides it. Only 2 % of the customers are ordering the goods without transportation. Therefore, in most of the cases, the company delivers the goods and that means that transport costs need to be included in the price. The customer's destinations that are closer to the company's location have lower selling price because of the transport costs.

If there is planned change in the prices because of the fluctuations on the market, the top management has a meeting, to decide the new prices for the customers (9-13). Then, the logistics department sends an official mail to all their customers. In the mail, the customers are informed about the new prices and the date when the new prices will be implemented. If some of the customers are not satisfied with the new prices, they try to negotiate and lower the price. In most cases, they first contact the logistics department to get more detailed information regarding the reason for setting a new price. Then, they contact the top management and try to negotiate lower price. The logistics department cannot change the price, only the top management makes decisions about changing the price.

Figure 10. Selling process model

Source: Own work.

Tender process (4-8)

Another situation when the top management needs to decide about setting a price is when they apply for a tender. Several factories or private businesses that own gas stations use the tender process to order the LPG. The top management reviews all requests for tenders (RFT) and decide which they are going to apply for and set the offering price. The logistics department prepares and sends the offers to the customers. The tenders are usually for big amount of quantity, and because of that, the top management allows payment to be at the latest three days after the delivery of goods. The result of the tender is usually known the following day. If the company won the tender, the logistics department includes the orders (next step) and outbound shipment plan.

Collecting orders (1)

The customers call the logistics department to make an order, one or two days before the delivery. If it is a big amount of quantity, they need to call earlier than two days. The logistics department gathers the orders and makes the outbound shipment plan at the end of the day.

When ordering the goods, there may be some negotiation process (14-17), depending on the amount of quantity that is going to be ordered. The logistics department enters orders in the system (18), prepares outbound shipment plan (19) and reports to customers (20). If customers accept the plan, the accounting department prepares pro-invoice and sends it to the customers (35, 36). When the payment is done, the accounting department checks the amount paid and reports it to the finance department (42). The finance department reviews the documents (43) and sends them to top management to sign (44, 45). If there are some mismatches and problems with documentation, the accounting department tries to investigate and solve the problem on their own (40). However, if the department is not capable to eliminate the issue, the top management takes over the responsibility (41). After the payment is done and the invoice is signed, the finance department reports to the warehouse to start the outbound shipment (47, 28, 29). The pro-invoice is sent by e-mail, so the customers can pay immediately. The original documents are sent by regular mail and the customers receive them two or three days later. There are around 10 customers which are regular and make large orders. For those customers it is allowed to pay on delay. The principle for them is to pay the previous order when they make the next order. For the companies that use tender procedure, it is also allowed to pay later, two or three days after receiving the goods. Another type of payment is with compensation. There are customers that have mutual finance obligations with the company, so in this way a compensation process is used.

Making the outbound shipment plan (19)

At the end of the day, the logistics department based on the collected orders prepares the outbound shipment plan for the next day.

The logistics department has the information for the warehouse capacity in Veles and the capacity of the gas station in Skopje. At the gas station in Skopje there is a logger that shows the quantity in the reservoir for LPG. So one optimal scenario is that if the reservoir at the gas station is not completely full, and the customer's location are on the way or near the gas station, the logistics department can use the same transport vehicle to fulfill the remaining quantity and deliver it to the gas station in Skopje.

The transport used for the delivery of the goods can be for one or more customers at once, that depends on the amount of quantity ordered and the tank that is going to be used. The logistics department reviews all alternatives to find the optimal scenario. When the plan is done, the customers are informed when the goods will be delivered at their location (20). If some customers do not agree with the time of delivery, the plan needs to be reviewed and to make a new optimal scenario (22, 23). There are cases when because of the destination of the customer, the tank could not be fully filled and the customer needs to pay the whole price for the transports costs. In that way, the logistics department reviews the following days and discusses it with the customer. Maybe the customer will decide to wait for one or two days to combine with other customers – in that way the transport costs will be lower because the costs will be divided. Another scenario is to suggest ordering bigger quantity and receive the goods two or more days later – in that way the tank will be fully filed.

The logistics department reports the outbound shipment plan to the warehouse department (24). At the end of the day, the employee of the logistics department, goes to the warehouse, gathers all travel warrants and signed Good Delivery Notes (GDN), and hands over the outbound shipment plan and travel warrants for the next day (25). The customers that must pay before receiving the goods are marked and the employee at the warehouse must wait for approval by the finance department, to give order to truck drivers to start the route (26, 27).

Realization of outbound shipment
When the truck drivers come back to the warehouse, the trucks are loaded with the standard mix of the goods. The loaded trucks are prepared to start their routes early in the morning. When the truck drivers come at the warehouse, they take the travel warrant and GDN. The warehouse department has the outbound shipment plan from the logistics department. For some routes, first the goods must be paid, so the truck drivers wait. After the customer does the payment, the finance department reports it to the warehouse (28), and the truck driver can start the route (29). At the customer's location, the man responsible to accept the delivery, signs the GDN for successful delivery of goods. The truck driver delivers the GDN to the warehouse (30-33).

Every day an employee from the logistics department gathers the GDNs and check if everything is as it was agreed with the pre-invoice (48). Then, the accounting department checks the information on GDN and prepares invoices (49, 50, 53). The invoices must be signed by the top management (54) and then send to customers (55). If something does not match, they discuss it with the logistics department and the top management (52). If the

documents do not match with what was delivered and what was agreed and paid, there is a discussion with the customers. The finance department just controls, follows the payment by the customers and reacts if something is wrong with the documents.

3.2 Business process improvements

3.2.1 Process issues and opportunities for improvements
Form the data gathered by workshops, from detailed analysis of the processes and from discussion with the employees, two main opportunities for improvement were defined:

1. Connecting the warehouse department to the network system
2. Organizing the data

In the following chapter, both opportunities are explained. The current state, suggested solution, costs for implementing and the reason why the company did not invest until now.

3.2.2 Network connecting of the warehouse department

The current state: The warehouse department is not connected to the administrative offices. At the end of the day, the employee from logistics department delivers the inbound and outbound shipment plan for the next day and collects all GRN. The following day the accounting and finance department check all GRN and enter them in the system. A lot of time is lost in waiting to receive the information. Another issue is the update of current warehouse status. The logistics department and warehouse department make contact several times during the day to discuss about the capacity status or inbound/outbound shipment plan.

Recommendation for improvement: If the warehouse department is connected, a lot of waiting time will be reduced and some of activities can be done simultaneously. The employee at the warehouse can scan or enter in the system GRN and the finance and accounting department can check and approve/reject the GRN. This activity then affects warehouse capacity data, calculation on average price, preparing invoices, controlling the flow of the good and following activities. With receiving data for GRN through the system, the finance and accounting department can start the execution of the following activities in the process flow. What is more, the warehouse department can update the capacity status and the logistics department will make better and more accurate plan for the next day.

Resources for implementation: For this solution to be implemented, basic technology assets are needed. Computer and internet connection, plus a scanner could be taken as an option. The level of responsibilities of the employees at the warehouse, was discussed in the workshops. The top management decided that it is best for the employees at the

warehouse to directly enter the data in the system and then the finance and accounting department will check (approve or reject) the GRN. The employees responsible for entering the data in the system will need to be trained for using the software Collab.

Why they didn't invest until now? - The previous warehouse location was 1 km away (cc. 5 minutes by car) from the company's administrative office and the company was renting the warehouse. During the years, the company business was profitable and the company started to grow. In 2010 the top management made a decision to invest and buy a warehouse. The current warehouse is distanced approximately 12km (around 20 minutes by car). The previous location of the warehouse was so near and the truck drivers came to the office and delivered the GRN. At first, the employees did not complain and did not recognize the issue. After some period, accounting department noticed that a lot of following activities depended on the delivery of the GRN at the office, but did not consider it as a big issue and did not report it.

3.2.3 Organizing the data

The current state: As mentioned in the Enterprise Infrastructure evaluation, the employees' computers at the office are network connected and there is one folder named Public documents where they share files that contains information important for all functions and departments. The company does not use any database tools for information gathering. This can be recognized as a costly issue in terms of asymmetric information, inappropriate pricing and losing loyal consumers. The current situation in the company is that they save most of the files in their systems, but for backup, they print some of the documents and have them in paper version. At the workshops, the employees mentioned that they are afraid of someone changing something in their file or changing the data in the shared file. Each user has more separate files and some users have the same data in different files, because each works from an individual point of view. The files are chaotic, including different languages (Macedonian and English) and different alphabets that make the connection of the files even more difficult. Sometimes the employees need to ask the creator of a file to explain the data, which actually is a time-consuming activity. If the creator is not available at the moment, they need to wait for an explanation.

Recommendation for improvement: How a company's operations are managed depends on the information they have. To increase the information system's effectiveness, the employees must be able to analyze and use the existing data. Databases and database tools allow good information structuring, processing and converting it into necessary information. At the same time, they provide a centralized view of data that can be accessed by multiple users, from multiple locations, in a controlled manner.

For the company, the first step is to organize and standardize the data. I suggest the data in the files that are used in everyday work to be organized in one single data source that would eliminate the multiple files containing same information and the time for searching the data in different files. For some data, the employees mentioned that they need more

complex calculation and time-consuming mathematical equations. By implementing formulas or queries the calculations can be automated, and what is more, it can lower the risk of making mistakes compared to calculations made by a person. Later, analyzed information can provide results to top management and employees that can help to make more certain and better decisions.

Having in mind all of this and to support and show the importance of data analysis and information systems, I provided an example for using database in Microsoft Access (MS Access). MS Access was chosen to create database, because is a user friendly management system and it was the quickest solution to represent the importance of data. In the following chapter, the program MS Access and the possible deliverables from the database are explained.

MS Access is a database management system (DBMS) provided by Microsoft. This professional system is user friendly and allows employees to easy adapt their work on it. The advantage of using MS Access is that employees can use data without using the internet. Another advantage is that the person responsible for maintenance of the database, could be an employee from the administrative office. This can be taken as an advantage until the person who is responsible decides to leave the work position. Then, for the new employee it will take some time to adapt to the data and continue to maintain the database. The data can be exported in Excel files and vice versa, Excel files could be used for creating the tables in the database.

Development of the database prototype
The most valuable key is to understand which data needs to be included to be able to gain insight from it. Therefore, together with the employees, I reviewed the files and selected the data. At the beginning, it was hard for me to find the logic behind the multiple sources and chaotic information and calculations. I needed to ask the same questions, several times, to the users of the file and the creator of the file. Many mistakes were discovered, due to incorrect input of data or not using the latest version of the files. Additionally, we found that the data in Excel files was not the same with the data exports from software Collab. First, I made a plan and organized the main data in tables for each department. In one workshop, we discussed and decided which data is duplicated, then combined it and created tables based on the derived outcome of the data (not based on department level). Later, I created keys in tables, to connect them and make queries. Queries are used to provide an outcome, which can be used for different functions. From literature review examples and discussion with employees, I provided some ideas how the data can be analyzed and where it can be used. After presenting it at the final workshop, employees chose only the benefits relevant to the company and I included them later in the thesis. Development of the prototype of database in MS Access lasted from January to March 2018. The database prototype for this case study is available for everyone to view and download the file free of charge. For information on how to access the file, see Appendices 2.

Deliverables of using database system

Tables were created for basic data information and each table has a primary key (in database marked as ID), which is unique and used to enable relationships between tables. Combination of relationships provided queries that give the desirable analysis of data and outputs. The relationships view of the database model is presented in Figure 11. For each table and query I provided an explanation on how the data could be used to keep track of relevant activities and to improve the activities in both processes. In provided tables and pictures of the database prototype, the original data for suppliers' and customers' information, personal information of drivers and financial documents are changed. In this way the personal information is protected and important data for business of the company is not revealed.

Figure 11. Relationships view in database model
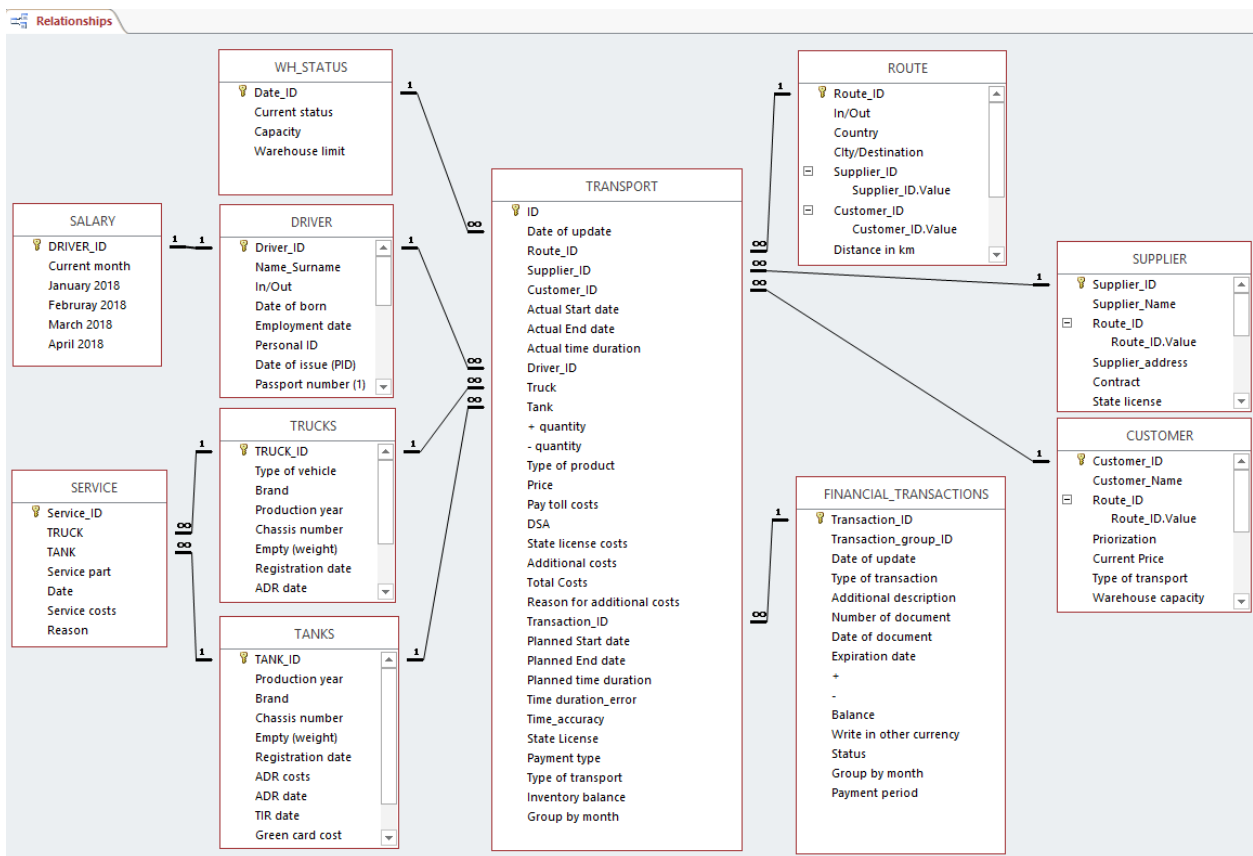
Source: Own work.

Table I: TRANSPORT

- Table TRANSPORT is the basic table in the database and all other tables are connected to this table. The table provides basic information for all transport orders – Route_ID, Start date and End date, number of days, Driver_ID, Truck_ID, Tank_ID, quantity, type of product, price, costs, state license and type of transport. Orders from customers that use own transport to deliver the goods are around 2 %. Due to the small

44

percentage, the employees decided not to divide orders and gather them all in one table under the name TRANSPORT.

- Additional costs and reasons for additional costs - Unexpected events can happened, such as car accidents, fast-driving fines, not having regular documents etc. These events influence the time duration of the route and can cause additional costs. Because of that, a column for reasons for additional costs is added and the company can keep track of the root causes. Reasons for additional costs can actually reveal information for truck-drivers that were not responsible more times and made additional costs for the company.
- Transaction_ID is connected to table financial transactions, and it represents the number of the financial invoice.
- Payment type – this field is used only for customers' orders and informs if the customer needs to pay before the delivery of the goods or later (delayed or with compensation). When the outbound shipment plan is delivered to the warehouse, this field is one of the factors that determines when the route execution can start.
- Planned start date, Planned end date, Planned time duration, Time duration error and Time accuracy – This area is used to keep track of each order and to provide data if there are any differences compared to the initial plan. In this way, the company will have an overview of the discrepancies (the list can be exported as report) and the root causes should be discussed. If some discrepancies repeat more often, corrective actions should be implemented.

Table II: CUSTOMER

- Basic information - Name of the company, mail, telephone, address, bank account number, main contacts (CEO, top management and responsible employees for contact).
- Route_ID - Field is connected to table Route and allows choosing the route/s for one customer (depends on the number of customer's properties).
- Customers' prioritization – Customers prioritization can be done based on past data (Query Customers_monthly). Customer prioritization is used, when the company needs to decide between two or more customers. For example, if there is time limitation or transport limitation and the company needs to decide which delivery of goods to make first, it will choose the customer who has higher priority than the other customer. In addition, prioritization influence in forming the customer price.
- Type of transport - In the oil and gas industry, one of the advantages compared to competitors is to have your own transport vehicles. It is useful to know, if the company's customers also own transport vehicles. In situations like traffic accidents or if the demand rapidly increases, the company can immediately contact its customers to rent their transport vehicles.
- Warehouse capacity – This information can be very beneficial in different situations. First, if it is a company's regular customer, the company can follow the situation of the customer's capacity and forecast the customer's orders in the future. In addition, it is useful because this data can help in the outbound shipment plan. In some scenarios,

when the outbound shipment plan is in process, you can negotiate/discuss that it is better to order now bigger quantity because it has lower price and in that way the company will release its warehouse capacity. Alternatively, if the customer owns a big warehouse capacity, when the supplier prices decrease, the company can order more from its supplier and rent the customers' warehouse.

- Reason for inactive - To have an archive of the customers that stopped cooperating with the company and the reasons why that happened. It is very important for a company to understand its own mistakes, learn and try not to repeat them in the future.
- Current price - The customers' prices change very frequently due to different factors (ex: market fluctuations, competitors' prices, ordering behavior, transport costs). Several times during the week, the logistics department and top management review the last price of the customers and update.
- Relationship to Query Customers_monthly provide data on monthly level for quantity ordered, number of orders, average of price and earnings. This help to make better decision for the current price for each customer.

Table III: DRIVER

- Basic information: name, surname, age, date of employment, work-experience.
- All documents needed for driving in the country and outside the country borders – personal ID, passport, driving license, international driving license and ADR certificate. Data for official document number and date of issue.
- Latest update of vacation dates. Later, vacation data is used in making the inbound/outbound shipment plan, and shows when the truck driver is not available.
- Relationship to Query Check_drivers provides information for all the expiration dates of documents.

Table IV: FINANCIAL TRANSACTIONS

- Basic information for financial transactions – date of update, type of transaction, number of document, date of document, expiration date, amount of money and financial balance.
- Transaction group_ID - For every order there is one invoice and one or more payment transactions. There can be several payment transactions due to the high amounts of money. Because of that, The Transaction group_ID is created to help search the data and gather all transactions executed for one order.
- Status - In process/Closed – this field helps to keep track if the payment for the order is done or is still in process.
- Relationship to table Transport connects the orders and financial transactions. Therefore, with opening the invoice in financial transactions, all data for the order is provided.

Table V: ROUTE

- Basic information - Destination, name of the supplier/customer, distance in km, costs for pay tools, DSA, total route costs and average time duration for individual route. The average time can be calculated and updated in a table once a year, based on the average time of all past routes during the year. With connection of tables, the average time helps in the planning process.
- Field In/Out shows if the route is in or out of the country borders.
- Relationship to table Transport provides information for all the orders in the past and shows the last order at the top.

Table VI: SALARY

- The company tries to be respectful to all truck drivers and puts effort to arrange equal wage for all of them. Therefore, in this table to archive the data for the salary in the past months and current month, which is later used in inbound/outbound shipment plan.

Table VII: SERVICE

- The regular services of the trucks and tanks are saved in the primary tables. This table is used to archive only the additional services for parts of the truck/tank. The table contains data for truck and tank ID, date of repairing, service part, costs and root cause.

Table VIII: SUPPLIER

- Basic information - Name of the company, mail, telephone, address, bank account number, value currency used for payment, main contacts (CEO, top management and responsible employees for contact).
- Route_ID - Field is connected with table ROUTE and allows choosing the route/s for one supplier (depends of the number of supplier's properties).
- Suppliers' prioritization – Suppliers' prioritization can be done based on past data (Query – Suppliers_monthly) and type of partnership. The period for payment of invoices is also one of the factors for prioritization. Suppliers' prioritization is used, when the top management makes the monthly demand plan and needs to select supplier. Therefore, for the top management it will be easier to decide which suppliers to contact first. This will help a lot in improving the suppliers' relationship.
- Contract - In explaining the procurement process, it is mentioned that the company has annual contracts with some suppliers. These contracts also influence the suppliers prioritization.
- Requirement of state license – If state license is required for the country, the company has two options: to buy state license or to use CEMT permit. The state institutions issue CEMT permits once a year. Therefore, this field helps in inbound shipment plan, when the costs for the route are calculated.

- Relationship to Query Suppliers_monthly provides data on monthly level for supplied quantity, average of price, costs and average of payment period. Therefore, the top management has overview on trending of the prices during the past months. This helps to make better decision in the process of supplier selection.

Table IX and X: TRUCKS and TANKS

- Both tables provide information for transport vehicles. In table TRUCKS are also added six solo vehicles which are used to deliver the goods to the customers. Because the data is similarly organized in both tables, I provide the explanation in one section.
- Basic information - Registration, capacity, date of buying, date of production, brand, registration date and chassis number.
- Documents needed for transport in the country and outside the country borders – TIR, green card, ADR certificate and insurance and date of issue for each document. These documents are not personal and the costs are paid by the company, so the costs for each document are included.
- Relationship to table TRANSPORT provides data for the orders for each truck/tank and shows the last order on top.

Table XI: WH_STATUS

- The table provides information about the current situation at the warehouse, maximum capacity and required minimum capacity (based on the government law).
- Relationship to table TRANSPORT enables view of all orders on that date.

Queries:

- Queries Check_drivers, Check_tanks, Check_trucks shows the availability of each element needed for executing the route (driver, truck, tank). The queries include data for vacation period, last route end date, next route start date, last salary, next service and alerts for all the documents with expiration period to the end of the year. To come to desirable outcome supportive queries were used: Expiration_date, Expiration_date_tanks, Expiration_date_trucks, Tanks_lastday, Trucks_lastday and Drivers_available. The data from these queries helps in the process of making the inbound/outbound shipment plan. These queries are later added as combo boxes in the form view and the user has all data for the available elements gathered in one place. Additionally, the employees can easily export as a report the documents that are going to expire in the following month and inform the responsible persons.
- Queries Customers_monthly and Suppliers_monthly are mentioned and explained above. Both queries provide data for customers and suppliers on monthly level. With only changing the filter, the time period can be changed on year or quarter level.
- Field Count of orders in Customer_monthly indicates customers ordering behavior. There are customers that order more times during the month, bigger quantity once a

month, or just order different quantity once, every month. The customers that order more times during the month are regular customers. On the other hand, the customers that order big quantity once a month, may have a big warehouse capacity or they have a customer that may be a factory or other business company that orders big quantities. This gives a sign to the company to research and make an effort to become a direct supplier to that business company. The customers that do not order regularly are likely using the company as a back-up supplier.

- Query Due date_Suppliers provides data for all the invoices that are past expiration date or need to be paid in the following 30 days. Additionally, it is calculated how many days are over the due date. This query can be used as an alert to the finance department. With only changing the filter, the query can provide the same data for the customers. To show care for its customers, the company can send an email two or three days before the due date and warn customers that are over due date.

- Query Quantity provides data for supplied quantity and demanded quantity on monthly level. In additional column the balance is calculated. In that way, it shows the accuracy of the monthly demand and supply plan and the discrepancies.

- Query WH_balance_daily provides the data of the daily fluctuations in the warehouse. It shows the current status on daily level, the supplied and demanded quantity and the balance. Additionally the column Stockout shows when there is more ordered quantity than available quantity at the warehouse and stock out situation appears.

In addition, employees can execute and print the queries or additional analysis of the data in more organized manner using report form. Form view helps to create a user interface and is directly connected to the data source. In the form view, the user can enter new data or change already existing data from the data source. For improving the main activities in processes I created two forms that are easy to use. I describe them below and explain the connection to the activities and gained benefits.

Form view CUSTOMER_price (Figure 12)

The form enables the top management and logistics department to quickly access relevant information in process of forming the customer's current price.

In the field "Search customer" employee writes the name of the customer and in the bottom of the form the data from query Customers_monthly appears. The form can also help during the negotiation process, if the customer calls to discuss about changing the current price, the top management has the overview of the data immediately.

Form view TRANSPORT (Figure 13)

The purpose of the form is to find or change data for past transport orders or to enter new transport orders. In addition, it provides data for availability of resources, which helps the user to make better inbound/outbound shipment plan. In the list of options, that is used to choose the correct route for orders, besides the name of customer and supplier, it also states the average time (in days) needed for execution of the route. When the user chooses the route, in the right part of the form, the average time (in days) is automatically written, which helps the user to enter planned start and end date and choose right resources (driver, truck, tank) for that period.

In addition, the data for average route costs and state license costs is automatically provided. The field WH status informs about the capacity status from that day, which helps the user to enter quantity, which is not above maximum or minimum limit. The list of options for field Driver, gives information about availability of the driver (end date of last route and start date of next route), vacation period, last salary and expiration date of documents. The same data (except vacations date and salary) is provided in list of options for fields Truck and Tank. The other fields, need to be entered by the user. After execution of the order, the user can open the already registered orders in database and enter actual dates, additional costs (if occurred) and update the status of Transaction_ID.

Figure 13. Form view -Transport

Source: Own work.

Resources for implementation: The price of license for MS Access is **330 euros.** Over time the system needs to be updated with the newer version. One employee will need to be responsible for maintaining the database. With using the database, time spent for daily activities will be shortened and one of the employees will be able to take over the responsibility to maintain the database.

The main reasons **why they did not invest until now** are as follows. The size of the organization is the first reason. For small and medium-sized organizations is much less likely to implement IT solutions than a larger organization. For these organizations, relatively small-scale solutions are acceptable for some period.

The second reason – top managers do not initiate investment in IT solutions. The top management is responsible for the decision how and in what to invest their time and money to increase the profit of the company. They approach to solutions to spread the business and invest in infrastructures, staff or machines rather than applications. One manager invests his time in networking, meetings, attending events and search for suppliers. He only uses the Argus application and does not need a specific technology support for his tasks. The other manager that works directly with the departments and overviews their

work is the one that must gather the inputs by all departments. The problems in his work made him consider that it is better to invest in transport vehicles or employing truck drivers, rather than better organizing of processes and technology solutions.

The employees also did not suggest investment in better organization of the data. The employees have mentioned their reasons for improving the technology assets and organization of the information system, but they did not have a good and supportive argument to convince the top management to take an action. The reason why it was not good enough was that the employees were not motivated and there was not good communication between departments to understand mutual dependences and obligations. The employees focused only on their own obligations.

As last reason it can be said that the lack of knowledge lead to wrong assumption about cost/benefit ratio. The top management thought that the IT investments were costly and the company's budget was not in a situation to support that kind of investments. What is more, the top management was not even conscious of all the benefits that could be gained from organizing the data.

3.2.4 Summary of gained benefits by recommended process improvements

In Table 2 I summarized all affected activities by both suggested process improvements. Some activities will be eliminated and for most of them the time will be shortened and the effort will be reduced. Additionally, I provided summary of overall gained benefits, if the improvements are implemented.

1. **Shorter cycle time** - The time spent on labor-intensive and non-value adding activities such as duplication of data entries, correction of errors in documentation and delivery expedition, will be eliminated. Electronic communication, automated notification, and data update will help in better managing of daily activities and quicker responsiveness to market changes.

2. **Faster and more accurate strategic planning** - The data about past sales, season and monthly price trends and track of daily orders will allow better demand forecasting based on accurate information. In addition, the update of the warehouse daily status and data for availability of drivers and transportation vehicles will allow developing optimal inbound/outbound shipment plans. Thus, transportation schedules and accurate inventory levels will enable better fulfillment of customers' orders, ensuring the quantity is delivered in the right place at the right time. As a result of process improvements, the database system will enable the company to share information without delays, operate based on projected demand, respond quickly to demand changes and be less vulnerable to risks.

3. **Improvement of suppliers and customers relationship** - Organized information will give a complete record of suppliers' and customers' data and will provide deeper understanding of their behavior. With analysis of customers/suppliers behavior, commercial priority will be defined. Database will allow to create, process and keep track of the orders. Any outstanding service issues will be noted, so similar undesired

events can be eliminated in the future. The due dates for payment can be reviewed and the company can make necessary actions beforehand. The company can provide real-time data to suppliers/customers for any detail of the inbound/outbound shipment plan and order status. History data for price changes and ordered/supplied quantities provide better overview of price trends that will show the price fluctuates in the past months and will influence the decisions for setting new prices. In addition, all provided information for price trend and sales are useful during the negotiation process. All in all, I can say that paying attention to execute payment on time, elimination of delivery delays, providing real-time information and reporting potential issues beforehand will strengthen the trust between the company and its customers/suppliers and lead to more successful deals and satisfaction on both sides.

Table 2. Summary table of affected activities

Element	Type of improvement
Procurement process	
Check and prepare list for all available resources	reduce time and effort
Gathering information for supplier	reduce time
Preparing RFQs and send to suppliers	reduce time
Negotiation	reduce effort
Planning the route	reduce time and effort
Review the outbound shipment plan	partial elimination – review only new routes
Waiting to hand over documents	eliminate – automated
Selling process	
Decision processes for tenders and market fluctuations activities	reduce time and effort
Collects data for customers and supplier	reduce time and effort
Negotiating about the new prices	reduce effort
Making plan of outbound shipment	reduce time and effort
Review the outbound shipment plan	reduce time and effort
Send plan to the warehouse department	eliminate – automated
Receive approval	reduce time
Waiting time to hand over	eliminate – automated

Source: Own work.

4. **Better connection between departments** - the key to successful outcome of process modeling and improvement is to engage and connect all employees across the company, eliminate department boundaries and automate the processing of information across different functions and departments.

If the top management decides to invest and implement the database system, the following suggestions can be developed in the future:

- to update table SALARY with more detailed calculations of the salary and include all factors that influence it.
- to create table for competitors prices and market fluctuations, and connect to suppliers and customers table. To keep track how the market fluctuation influences all prices.
- to create forms for other tables that are frequently used.

4 CONCLUSION

4.1 Interpretation of Main Findings and Contributions

The main objectives in this master thesis are the investigation and modelling of critical core processes (procurement and selling) and recommendation of process improvements in an oil and gas company. The case study was used as a research method and was conducted from May 2017 to March 2018. The obtained information from workshops and interviews and the acquired knowledge for BPM and SCM contributed in modelling the processes and developing ideas for future process improvements.

In the theoretical part of the thesis, the main supply chain processes were defined and explained. So, we can see that in order to be able to achieve a balance between demand requirements and company's supply capabilities, almost all departments need to be involved in the process of developing the plan. What is more, the unstable market in this type of industry requires companies to be agile in order to survive the high competition. Therefore, companies need to focus on effective coordination of plans, multiple sourcing and routing options, partnership with main suppliers, keeping track of important customer data and providing good customer service. To manage all of these, first the companies need to define and understand business processes, process dependences and information flows.

Furthermore, from the empirical part of the thesis, we can see how a real case of process modelling of procurement and selling processes in an oil and gas company was developed. By analyzing the gained information from employees' experiences, their different point of views and interactive discussions, the process models were developed. In process modelling, time and effort were invested in creating the flow of activities, deciding what inputs and outputs are needed and for which purposes, which activities are dependent and the right accuracy for time duration. Main areas of concern were the communication

between departments, taking responsibilities for functions, low level of motivation for cooperation and not using a single source for data and documentation. Feedback for final process models were taken from employees, to assure that the models give effective summary of the workflow in procurement and selling processes. The processes are interconnected. In order to accept all customer orders and deliver at the right time, the company needs to forecast, order the right quantity by suppliers and deliver to the warehouse. Due to turnover of high amount of money, all of that needs to be supported by a good financial plan. To sum up, the main source for better plan for both processes is a combination of information for sales, forecast, inventory and distribution. Therefore, the result of process modelling was increasing the level of consciousness between departments for each activity's value and importance in the whole process chain.

The second part of the case study puts focus on discovering new ways of working and optimizing core business links. Most of the employees understood the information flows after the process models were visually presented. Even I, as an observer, can say that it helped me to better understand what was going on in the organization and it gave me an idea for process improvements. Changing the warehouse location resulted in a delay of documents delivery to central offices, but nobody had complained about it before or reported it as an issue. Therefore, network connecting of the warehouse office with central offices was defined as first recommendation for process improvement. In this way, the documents will be digitally sent to central offices and the data for warehouse capacity status can be updated more frequently. Here we can recognize a benefit of process modelling, which brings everyone in the project to the same level of thinking and understanding the business and leads to discovering options that may not have been otherwise thought of. Guided by main problems in both processes, I came up with an idea of improving the efficiency of information transfer, which will directly contribute to better manage the inventory level, streamline the flows of logistics and improve the customer service. So, I propose organizing the data by implementing a database system. Therefore, this approach will integrate functions and capture all process-related information. I developed a database prototype that includes only relevant data for main activities and provides better overview of resources. Information access benefits provide top management with faster and easier access to internal information. What is more, information flexibility allows employees to easily manipulate the content and format of retrieved information.

Overall, we can agree with the statement that every company has its own way of working and critical issues can be found in every department or function. In this case study, we have medium-sized company that even though is profitable, did not invest time in developing business process approach to the organizational structure and did not try to improve the connection between the departments. Sometimes, companies require outside help to recognize opportunities and implement innovations. Another thing that is recognized from this study is that mutual communication, organized information system and integration of process activities are powerful elements that can bring positive outcome, speed up the workflow and provide more efficient services to its customers and suppliers.

The whole research was demanding and required a lot of time and effort by both sides. This kind of projects can be very costly and require even more time, especially in cases when the company is not aware of the internal problems and engages outside help to analyze their situation. In the end, the overall project brought many benefits to both sides. For me, as a student, to learn and gain practical experience, develop working and analytical skills and improve my knowledge in more areas connected to BPM and SCM. While, for the company, it improved the internal cooperation, raised awareness of data importance and provided ideas for future improvements. Further, the findings of this study will be useful for employees in the selected company and can be used as training material for new employees in the future. The recommended improvements might be implemented in the company and the process models can be used for better understanding of information and flow of activities. In addition, other companies with the same problems may gain ideas to implement the same process improvements in their companies. Finally, this study contributes to enriching the examples of case studies in existing literature for SCM and BPM. This means that the research can be used as an example and provide ideas for other researchers too.

4.2 Recommendation for further research

Finally, the main recommendation for future research is to expand the case study and execute simulations. With analyzing the quantitative results obtained from simulation, the cost-benefit analysis can be conducted. Another direction for further research can be process modelling of the other core processes. Additionally, the database system can be further developed to provide support to all other functions and departments. This could give more vivid picture of all company processes and process dependences.

Furthermore, we can see that in the past, the employees did not like the idea of new technology solutions, which brings to another idea for research - investigation of employees' attitudes towards changes. Readiness for change is not automatic and it cannot be easily acquired. Human reactions to changes are difficult to be predicted and can be a determining factor for successful implementation of innovations. Besides employees' attitude, there is a possibility for other issues to appear during the implementation. One of them is the learning process of using the database system. One of the employees will be able to support the maintenance of database, but that is not promising that it will be easy to transfer the knowledge to others to use the database by themselves. Maybe, there will be need for outside help for training the employees. Therefore, another idea that can be developed as further research is defining a strategic plan for implementing the process improvements and potential issues during implementation. In the plan, every step can be clearly defined and the roles can be assigned to individuals who will be responsible to control the implementation of the process improvements.

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APPENDICES

Appendix 1: Povzetek (Summary in Slovene language)

"Oskrbovalna veriga je dinamičen proces, ki obsega neprekinjen tok informacij, materiala in sredstev skozi več funkcijskih področij, znotraj in med člani verige, z namenom izpolniti potrebe kupca in maksimirati dobiček" (Jain, Wadhwa & Deshmukh, 2009, str. 3013).

Mohanty in Deshmukh (2005) management oskrbovalne verige (SCM) definirata kot zanko, ki se začne in konča s kupcem. Skozi zanko nemoteno tečejo procesi, ki so podprti s poslovnimi funkcijami. Oskrbovalna veriga je tako integracija vseh ključnih poslovnih procesov, pri čemer se na nanjo gleda kot na neprekinjeno poslovno transakcijo (Lambert, 2004).

Dejavniki kot so globalizacija, tehnološki napredek, ostra konkurenca in povečana pričakovanja kupcev so skozi leta spremenili poslovno okolje in v središče postavili management oskrbovalne verige (SCM), katere gonilo je kupec in njegove potrebe ter želje. Posledično so podjetja začela opažati težave v vodenju, čemur so sledili ukrepi iz vidika oskrbne verige (Lu, 2011).

Uspešnost osrbovalne verige je odvisna od ujemanja ponudbe podjetja s kupčevimi potrebami. Vsak kupec je drugačen in ima edinstvene potrebe. Zato je ključnega pomena vedeti, kako se lahko izboljša odnos s stranko in poišče način sodelovanja, ki bo prinesel dobre rezultate na obeh straneh (Botha & Van Rensburg, 2010).

Naftna in plinska industrija dnevno zahteva transport velikih količin tako na domačem, kot tudi na svetovnem trgu zaradi česar se lahko identificira kot specifična industrija, ki vključuje veliko podjetij, kompleksne operacije in konstanten materialni tok. Oskrbovalna veriga vključuje vse, ki so odgovorni, da izdelek pride v roke kupca. Zaradi sprememb na trgu, morajo podjetja poiskati nove načine za reševanje svojih problemov, s čimer lahko dosežejo boljšo dobičkonosnost. To pomeni odkrivanje novih načinov dela ali opravljanja aktivnosti vzdolž oskrbovalne verige, ki podjetju prinašajo dodano vrednost (Chima & Hills, 2007). Podjetja so začela implementirati operativne inovacije z uporabo Managementa poslovnih procesov (BPM), z namenom dosegati konkurenčne prednosti (Siriram, 2012).

Jeston in Nelis (2014, str. 4) v svojem delu "Business process management", management poslovnih procesov definirata kot:

"Disciplino usmerjeno v uporabo poslovnih procesov kot pomembnih faktorjev za doseganje ciljev organizacije skozi izboljšave, neprekinjeno obvladovanje uspešnosti in upravljanje ključnih poslovnih procesov."

Management poslovnih procesov se prične z razumevanjem poteka dela, tako da je v ospredje postavljen proces. Proces sestavljajo aktivnosti, medsebojne povezave in povezani

postpki, ki skupaj omogočijo dosego ciljev z preoblikovanjem vložkov v določen rezultat (izdelek/storitev), za končnega kupca, ob vključevanju različnih orodij, metod in ljudi. Vsak proces mora tako imeti začetni dogodek, imenovan sprožilec in končni dogodek, s katerim se proces zaključi (Tenner & DeToro, 1997; Zhang, 2005).

Za učinkovito spremljanje in nadziranje uspešnosti podjetja, je potrebno implementiran SCM najprej dobro preučiti in razumeti. Razumevanje SCM se začne s preučevanjem vsake aktivnosti in njihove medsebojne povezanosti, saj le-to lahko omogoči pregled nad trenutnim stanjem poteka dela. Kasneje lahko dobro nadziranje in stalne izboljšave privedejo do operativne odličnosti ali celo do operativnih inovacij (Chen & Paulraj, 2004; Hammer, 2004). Operativna odličnost zmanjša napake, stroške in zamude, kar omogoči da je delo opravljeno v skladu z zahtevami, brez bistvenih sprememb in visokih investicij (Copacino, 1997).

Določanje in izbira pravega procesa za prenovo je težka odločitev. Gre za dolgotrajen postopek opazovanja, preučevanja in modeliranja procesov, kar zahteva določeno raven znanja za iskanje potencialnih izboljšav. Če podjetje nadzira in razume večino procesov v oskrbovalni verigi, lahko zmanjša čas, potreben za odziv na grožnjo ali problem.

Namen te raziskovalne naloge ja razumeti okolje dinamične oskrbovalne verige na primeru makedonskega podjetja, katerega glavna dejavnost je uvoz in izvoz utekočinjenega naftnega plina (LPG). Glavni cilji te magistrske naloge so preučiti in modelirati kritične ključne procese (nabava in prodaja) in predlagati izboljšave. Kot raziskovalna metoda je bila izbrana študija primera, ki je bila izvedena v obdobju od maja 2017 do marca 2018 in je vključevala več metod zbiranja podatkov:

- Poglobljeni intervju: Poglobljeni intervjuji so bili izvedeni osebno, v makedonskem jeziku. Usmerjeni so bili k naslednjim petim ključnim točkam: (1) aktivnosti in odgovornosti zaposlenih v procesu nabave in prodaje, (2) trajanje aktivnosti, v katerih zaposleni sodeluje, (3) komunikacija in sodelovanje z drugimi oddelki, (4) dojemanje zaposlenega o povezavi podjetja z managementom poslovnih procesov, (5) priložnosti in ovire pri nadaljnjih izboljšavah, (6) pretekle spremembe in pobude za IT oddelek.

- Delavnice: Sedem delavnic je pomagalo pri razumevanju trenutnega stanja poteka dela v podjetju, pri modeliranju procesov, služile pa so tudi kot pobuda za razpravo med zaposlenimi. Naknadno je bilo izpeljanih nekaj dodatnih delavnic, na katerih se je preučilo bolj problematične in težje razumljive aktivnosti. Delavnice pa so zaposlenim omogočile, da so si izmenjali mnenja in se izzvali v svojih pogledih.

- Kratki pregledni sestanki: Sestanki so bili izvedeni redno, za vrhnji management. Trajali so med petnajst in trideset minut in bili namenjeni razpravi o nejasnostih ter o rešitvi nadaljnjih težav.

- Opazovanje dela: Z dostopom do vse dokumentacije sem lahko opazovala delo zaposlenih, programsko rešitev, ki jo uporabljajo za upravljanje in nadziranje podatkov, povezanih s procesom in aktivnosti in informacije, ki se izmenjujejo med oddelki. Razpravljajo se je o programskih rešitvah, ki so bile implementirane v podjetju in katere prednosti zaposleni prepoznajo v njih.

- Delno strukturirani intervjuji z zaposlenimi (ki niso sodelovali v delavnicah), strankami in dobavitelji: Sedem delni strukturiranih intervjujev je bilo izvedenih preko telefona s strankami in trije preko programa Skype z dobavitelji. Njihovi odgovori so mi pomagali izboljšati razumevanje procesov in pri določitvi aktivnosti, katerih izboljšanje bi lahko vodilo v boljši odnos med podjetjem in dobaviteljem ali kupcem.

Pridobljene informacije iz delavnic in intervjujev so poleg znanja iz BPM in SCM prispevale k modeliranju procesov in razvijanju idej za nadaljnje izboljšave.

V prvem delu študije sta definirana oba poslovna procesa, njuna procesna odvisnost in informacijski tokovi. V praksi se oba procesa dogajata istočasno, a vseeno rezultat prodajnega procesa sproži nabavnega. Podjetje dnevno spremlja situacijo na borznem trgu in posebej posveča pozornost fluktuaciji cene. Nabavni proces sproži odločitev managementa o kreiranju naročila na podlagi mesečnega plana povpraševanja, čemur sledi iskanje in izbira dobavitelja, kreiranje in kasneje sklenitev pogodbe. Temu sledi načrtovanje transporta in pridobivanje blaga. Proces se zaključi s sprejetjem blaga v skladišču, kar sproži proces prodaje. Na podlagi naročil kupca, se izvede izhodna pošiljka, ki ji sledi transport blaga do kupca (ali do bencinskih črpalk), kar pa se konča s prejetjem plačila.

Z analizo prejetih informacij iz strani zaposlenih, njihovih izkušenj in pogledov ter interaktivnih razprav, so bili razviti procesni modeli. Pri modeliranju procesov je potreben čas in trud za določitev toka aktivnosti, potrebnih vložkov in rezultatov ter njihovega pomena, povezav med aktivnostmi in pravilnega časa trajanja. Največji problem je predstavljala komunikacija med oddelki, prevzemanje odgovornosti za funkcije, nizka stopnja motivacije za sodelovanje in uporaba več virov podatkov in dokumentacije.

Da lahko sprejmejo vsa naročila strank in dostavijo blago v pravem času, morajo v podjetju napovedati in naročiti pravo količino pri dobaviteljih in jo dostaviti v skladišče. Zaradi obsežnih denarnih tokov mora biti vse to podprto z dobrim finančnim planom. Posledično so glavni viri za izboljšave procesov informacije o prodaji, napovedi, zaloge in distribucija. Rezultat modeliranja procesov je bil dvig zavedanja o pomembnosti posameznih aktivnosti tako znotraj oddelkov kot tudi znotraj celotne oskrbovalne verige.

V drugem delu študije je poudarek na odkrivanju novih načinov dela in optimiziranju osnovnih procesnih povezav. Večina zaposlenih je tok informacij celovito razumela šele po predstavitvi procesnih modelov. Izdelani modeli pa so pomagali tudi meni, kot opazovalcu, bolje razumeti dogajanje v podjetju in kasneje pri iskanju predlogov za izboljšave. Zaradi

spremembe lokacije skladišča, dokumenti niso pravočasno prihajali do podjetja, vendar zaposleni tega niso izpostavljali kot težavo. Tu se je pokazala prva priložnost za izboljšavo procesa in sicer v povezovanju skladišča z centralnimi oddelki.

Kot drugo izboljšavo pa predlagam organizacijo podatkov z uporabo baze podatkov. Posledično bi tak pristop združil funkcije in zajel vse informacije, povezane s procesom. Razvila sem prototip podatkovne baze, ki vsebuje zgolj podatke za glavne aktivnosti in nudi boljši pregled nad viri. Baza podatkov vrhnjemu managementu omogoča hitrejši in lažji dostop do internih informacij. Poleg tega pa fleksibilnost informacij omogoča zaposlenim lažjo obdelavo podatkov.

Spodaj so naštete glavne prednosti, ki bi jih podjetje pridobilo, če bi implementirali predlagane spremembe.

Krajši cikel: Čas cikla bi lahko skrajšali predvsem zaradi krajšega časa, ki je po naravi delovno intenziven in namenjen aktivnostim, ki ne prinašajo dodane vrednosti kot je npr. podvajanje podatkov in zaradi prenehanja popravljanja napak v dokumentaciji. Elektronska komunikacija, avtomatsko obveščanje in posodabljanje podatkov bi pomagali pri boljšem upravljanju dnevnih aktivnosti in hitrejši odzivnosti na spremembe trga.

Hitrejše in bolj natančno strateško planiranje: Podatki o pretekli prodaji, sezonski in mesečni cenovni trendi, sledenje dnevnim naročilom, bi omogočili boljše napovedovanje, ki bi temeljilo na dejanskih podatkih. Poleg tega bi zaradi dnevne posodobitve statusa skladišča in podatkih o razpoložljivih voznikih in vozilih, lažje planirali optimalne vhodne in izhodne pošiljke. Razpored transporta in točen podatek o zalogi bi omogočil učinkovitejšo izpolnitev kupčevih naročil, zaradi zagotovitve, da bo željena količina dostavljena v pravem času in pravi količini. Podatkovna baza bi izboljšala proces, saj bi sistem podjetju omogočil izmenjavo informacij brez zamud, delovanje, ki bi temeljilo na točnih napovedih, hitrejšo odzivnost na spremembe v povpraševanju, kar bi posledično pomenilo manjšo ranljivost v primeru tveganj.

Izboljšanje odnosa z dobavitelji in kupci: Zaradi organiziranosti informacij bi imeli celosten pregled nad dobavitelji in kupci, kar bi jih nudilo boljše razumevanje. Z podrobnejšo analizo deležnikov, bi lahko določili raven pomembnosti. Podatkovna baza bi omogočila kreirati, procesirati in beležiti naročila. Identificirali bi lahko probleme, ki bi jih lahko pred naslednjo ponovitvijo preprečili. Imeli bi pregled nad roki plačil zaradi česar bi lahko predčasno ukrepali, v kolikor bi to bilo potrebno. Sposobni bi bili priskrbeti natančne podatke za vse vhodne in izhodne pošiljke ter za status naročila. Zgodovinski podatki o spremembah cene in naročenih količinah bi nudili celosten pregled nad trendom in fluktuacijo, kar bi pomagalo pri odločitvah za ceno v prihodnosti. Takšni podatki pa bi služili tudi pri cenovnih pogajanjih. Zaključim lahko, da bi posvečanje pozornosti za plačilo v roku, ukinjanje zamud pri dobavi, skrb za točne podatke in poročanje potencialnih težav vnaprej, utrdilo zaupanje podjetja s kupci in dobavitelji, kar bi vodilo v uspešnejše posle in zadovoljstvo na vseh straneh.

Boljša povezanost oddelkov: Ključ za uspešen rezultat pri modeliranju in izboljševanju procesov je vključevanje in povezovanje vseh zaposlenih v podjetju, ukinjanje mej med oddelki in avtomatizacija pretoka informacij med oddelki.

Zaključim lahko z dejstvom, da ima vsako podjetje svoj način dela in da je težave moč najti v vsakem oddelku. V tej študiji primera je preučevano srednje veliko podjetje, ki kljub temu da je dobičkonosno, ni vložilo dovolj časa v razvoj managementa poslovnih procesov in izboljšanju povezave med oddelki. Včasih podjetja pri tem potrebujejo zunanjo pomoč, da tako uvidijo priložnosti ter implementirajo izboljšave.

Iz te magistrske naloge lahko ugotovimo, da so medsebojna komunikacija, organiziran informacijski sistem in integracija procesnih aktivnosti pomembni elementi, ki lahko prinesejo pozitivne rezultate, pospešijo delovni tok in zagotovijo učinkovitejše storitve tako kupcem kot dobaviteljem. Poleg tega so rezultati študije uporabni za zaposlene v izbranem podjetju, predlagane izboljšave se lahko implementirajo v podjetju, izdelani procesni modeli pa se lahko uporabijo za boljše razumevanje informacij in toka aktivnosti. Prav tako lahko druga podjetja, ki se soočajo s podobnimi težavami, pridobijo ideje za implementacijo procesnih izboljšav.

Appendix 2: Database prototype access

The database prototype for this case study is available for everyone to view and download the file free of charge at:

https://www.dropbox.com/sh/yorc3q7p7xxb5f2/AACSIAi47_qMErs1Z-bNCHmua?dl=0

Microsoft Access files usually could not be opened and used online. Because of that, I created zipped version of the database prototype which can be downloaded and used by everyone on their computer. I provide both versions of zipped files (7-Zip and WinZip), so the user can download and use the zip type that he/she prefers.
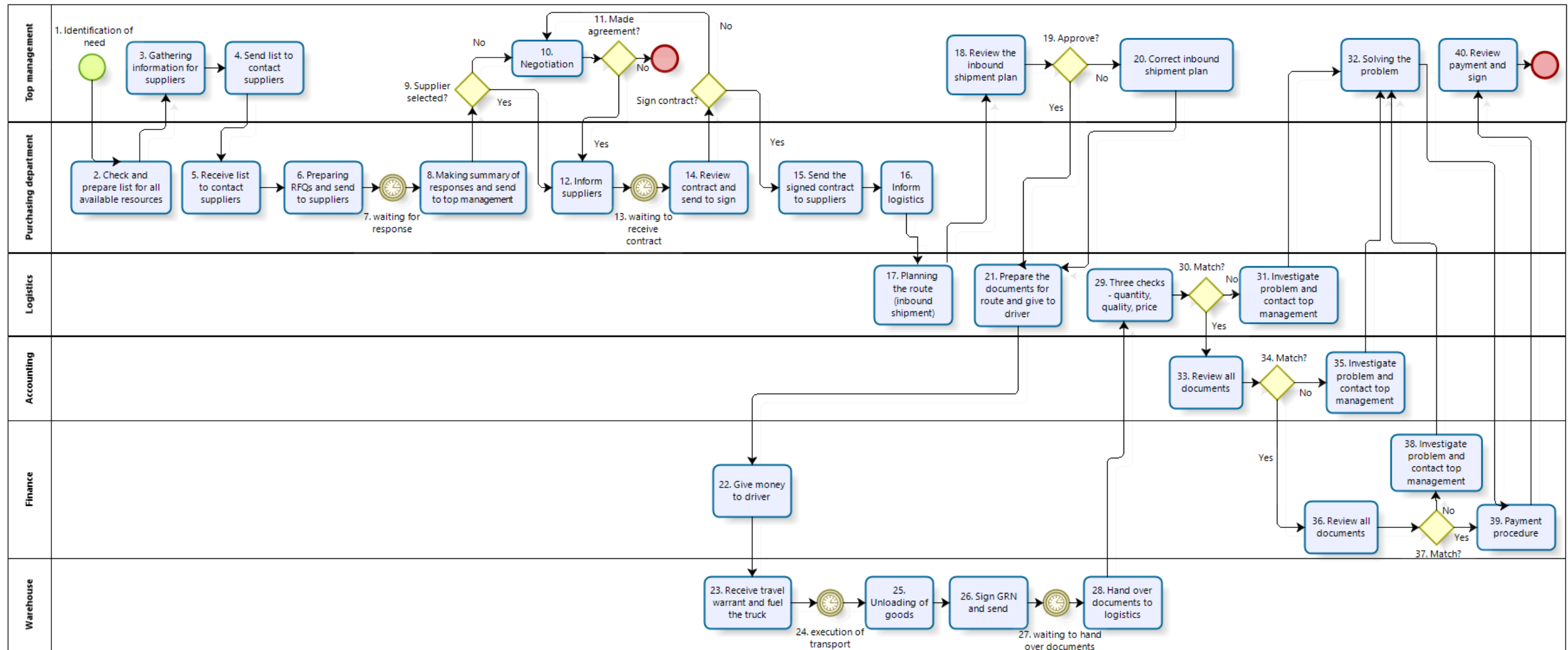
Figure 14. Procurement process model (A3 format)

Source: Own work.

Figure 15. Selling process model (A3 format)

Source: Own work.