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Developing transportation data and freight spend visibility

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The global shipping environment is continuously quickly changing, which means that shippers have to stay up-to-date on the latest trends and even a step ahead to keep pace. The control of transportation costs, which is often the largest component of total logistics spend, is an increasingly important area where the companies should focus when looking for competitive advantage. Managers require more accurate and focused transportation and freight spend data as well as forecasts for preserving margins and profitability as well as improving supply chain performance. A large number of companies with significant transportation spend are unable to aggregate all of their shipping data into one location for analysis by the management. It is an issue in my case company as well, which is examined in this thesis.

The objective of this study is to produce an approach to improve transportation data and freight spend visibility and give an opportunity of quickly get spend information, to do a costs analysis and projections for the future. The outcome of the work is a list of recommendations for the case company to follow in order to reach the objective. The case company is chosen from the pharmaceutical industry.

An action research is conducted in the organization. I have investigated the current state of the case company's transportation data and freight spend management and data sources to gain insights from strengths and weaknesses of the present process, including the experience and practices in the company’s other business units. As a theoretical background, the best practices of freight spend management were studied as well as the latest trends in modern technology – business intelligence tools solution for deploying predictive analytics and for building the necessary data visualization, to form an idea what could be improvement steps for my case company. In order to strengthen the conceptual framework I have undertaken interviews with practitioners – specialists and experts in the logistics field.

Based on the analysis of the current state and the best practices in the field, a list of recommendations was prepared and some highly important issues and processes defined as needed to be refined before or in parallel with the main suggested steps towards this work objective. The recommendations were positively met by the informants and taken into use as a part of the immediate and long-term continuous improvement projects.

Keywords
Transportation and freight spend data, Freight spend forecasts, Transportation metrics, Visibility, Visual analytics tools
PREFACE

Here I am, walking my final steps to the graduation, and my thesis work is written. I feel really emotional as it was a hard journey for me. Many things had changed since I entered Metropolia. I have got the most wonderful present in my life – my daughter Valentina was born. I have moved to another country and I have changed the job. Consequently, the initial thesis topic, on which I have already started to work, I had to substitute in a very short time. It was definitely challenging and sometimes nearly impossible to combine the life with the studies. But on the other side, I am highly proud of myself that in spite of all the difficulties I kept on moving towards new knowledge and self-development. Now I know that having the right motivations, you really can activate all your inside strengths in order to make your dreams come true.

I am very much happy about my thesis. In fact, finally I was researching on the problem in the field – logistics, which is very close to my heart. I had an opportunity to deeper investigate already in the past noticed issue, find the solutions and validate it in the practice.

However, without a strong support and encouragement during the weakest moments I would not make it. That is why from all my heart I would like to thank my lecturers of Metropolia for the knowledge received and irreplaceable skills I got improved, my work colleagues and all my family.

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1 Introduction

Effective supply chain is companies' key success factor and competitive advantage. Increasing visibility in supply chain activities is a must have strategy for companies aiming at reducing costs and improving operational performance, especially in the conditions of growing complexity in organization structure.

Transportation is still the largest cost component in supply chain management, that is why it is important to monitor the freight spend proactively. Though it sounds simple, it is a challenging issue for many companies as multiple enterprise resource planning systems and data sources in the organization lead to difficulty in gaining all the information on freight spend and manipulating with it.

When the appropriate analytical tools to manage complexity and guarantee visibility are in place, transportation transparency can be achieved, which will provide a company with the opportunity to continuously create operational efficiency, to optimize the supply chain and improve the bottom line – value for shareholders.

1.1 Background and motivation for starting the thesis

I am a logistics professional with more than 15 years of experience in transportation, trade and compliance, warehousing and customs operations. I am really interested to analyze and study the trends and the challenges in the supply chain. Along the years I have learned that transportation cost monitoring is one of the main pain spots of many companies, therefore I would like to focus on that in this thesis to understand the root cause and identify solutions that can enable a better performance. Moreover, in October 2017 I have changed the job joining a company in very new for me pharma sector.

In order to protect biologics and pharma products from becoming ineffective or even harmful to patient, pharmaceutical industry is relying on the cold chain. The value of temperature-controlled pharmaceuticals being shipped is growing, proving that the industry is learning how to manage very high cold chain costs more efficiently (Pharmaceutical Commerce, 2017). Transportation cost monitoring and control is one of the priorities for the supply chain team in my company. Regardless the challenges, I am
really motivated to bring my expertise, learn about the processes and create recommendations for improvement to guaranty better transportation costs transparency and awareness.

This thesis will consist of seven chapters. First chapter is an introduction, describing background and motivations for starting the thesis, research objective, outcome, limitations and case company and its industry. In the second chapter I will highlight research methodology, discuss about the rigor, validity, reliability and generalizability of this thesis and introduce the structure of the research. Third chapter will present current state analysis and stakeholders’ requirements for the ideal state. Fourth chapter will be with conceptual framework in order to support research output development. Building the proposal for transportation and freight spend data visibility development and its validation with informants (supply chain managers), managers’ feedback and final proposal will be in the main chapters number five and six accordingly. In the final chapter I will discuss the findings of the research and provide suggestions for future implementations.

1.2 Research objective and outcome

Participating within three months in daily activities and talking to the supply chain managers in my company, I have identified that the following business problem exists: freight spend and transportation data is fragmented and manually processed, there is no opportunity of quickly get spend information, to do analysis and projections for the future. Freight costs have grown dramatically and there are no capabilities in place for granular analysis and comparison if it is in line with the increase in the operations.

This is highly important to refine, because the visibility and deeper understanding of freight spend profile will allow transportation costs control, potential savings by minimizing wasteful transportation spend and contributing into company’s profitability improvement. As well as having possibility for automatic spend forecasts will drive operational decision-making, immediate shipping strategies adjustment, customer service in terms of on time delivery and demand responsiveness and finally all supply chain sustainability.
Given this, the objective of this study is to produce an approach to improve transportation data and freight spend visibility and give an opportunity of quickly get spend information, to do costs analysis and projections. The outcome of the work is a list of recommendations for the case company to follow in order to reach the objective.

Prior to any improvements I will assess the current state of my company's transportation data and freight spend management and data sources to gain insights from strengths and weaknesses of company's present process, including the experience and best practices of the company's other business units.

1.3 Limitations

In my work I have to assure confidentiality of my case company. It is challenging in terms of the research itself. Fully confidential research cannot be conducted, because the researcher has to reveal and report the findings of the study to the public. I can not disclose any company's data or interviewees' names.

For privacy reasons, I will simply refer to the case company as "the company x" throughout this paper.

In this thesis I have focused only on transportation costs data as it was a higher priority for my case company. But other components of logistics costs could be added to the visibility improvement project later as well. It is out of scope of this thesis.

1.4 Case company

My case company (x) is one of the global biopharmaceutical companies, its mission is to produce innovative medicines that help patients to fight serious diseases. I am incredibly proud of the work the company does and the differentiated impact it is making on the lives of so many people across the globe.

Biopharmaceuticals are among the most sophisticated and elegant achievements of modern science. They are medical drugs produced using biotechnology – that is, therapeutic products created through the genetic manipulation of living cells or organisms. If to compare with the traditional pharmaceuticals produced using chemical synthesis, the
manufacturing process for protein-based therapeutics is more complex and very expensive to the organization (Milne, 2013).

Biopharma companies have much higher operative costs due to their focus on research and development. At the same time strong demand for innovative drugs has driven significant profits, despite the high cost of goods sold.

This industry is characterized by extremely high degree of competition across and a very dynamic environment aiming to patient-centricity nowadays. Du Plessis et al. (2017) state that patient centricity is a new mindset, when pharma companies are challenged to engage and collaborate with patients to get critical input for determining the best strategy to improve patient outcomes. This change from a brand focus to a patient-value focus requires leadership from the top and drives the need to redefine strategy, organizational structure and processes, and capabilities to focus on transparency, credibility, and value for the patient.

Within the pharmaceutical industry inward and outward flow of goods is strictly controlled by the supplying site in order to protect them against of breakage, adulteration and theft, and to ensure that temperature conditions are maintained within acceptable limits during transport. For temperature-sensitive products, qualified equipment (passive thermal boxes, active temperature-controlled containers or temperature-controlled vehicles) should be used (MHRA, 2015).

A lot of high value pharmaceutical products moving along the cold chain are for clinical use. Clinical research and trials is a major part of the industry. Some of one-of-a-kind medicines need to be delivered directly to the patient. All this requires unique and customized transportation conditions, single-source accountability, attention to detail, and uncompromised reliability from transportation service providers, and means very high logistics costs.

Alicke & Lösch (2010) state that transportation costs come from hundreds of thousands of widely distributed individual operations every year. And that complexity is what makes transportation difficult to improve. Many pharmaceutical companies have tremendous variability in their transport operations, with different customers demanding different service levels and a multitude of transport providers delivering services in
Company’s business unit where I work is very new. It was established to manage operations in x region but also for SC processes improvements purpose globally. That is why I see very good opportunities for driving positive changes internally at the time benchmarking the best practices from other business units and harmonizing within the whole organization.

2 Methodology and structure of research

2.1 Research approach

This thesis’s research is a research in the social world, which requires quite a special set of assumptions and procedures. By its nature it is an action research in the organization, as it is not only investigative process for the purpose of creating new knowledge, but both taking action and creating knowledge about that action. According to Coghlan & Brannick (2010), action research works through a cyclical process of consciously and deliberately: (a) diagnosing; (b) planning; (c) taking action; (d) evaluating the action, leading to further planning and so on. The second dimension of action research is that it is collaborative. The members of the system which is being studied participate actively in the cyclical process. And the third is that action research is both a sequence of events and an approach to change and to a problem-solving.

Coghlan & Brannick (2010) present an action research cycle comprising a pre-step, context and purpose, and four basic steps: constructing, planning action, taking action and evaluating action (Figure 1).
In practice I am following multiple times that above mentioned cyclical process, being in constant collaboration and co-operation with my research objective stakeholders – supply chain managers and my company’s other managers (Finance and IT department) and colleagues for the purpose of research problem solving, learning from the outcome and hopefully adding to the organizational knowledge.

According to Stringer (2013), action research is systematic and rigorous process of inquiry or investigation that enables people to understand the nature of problematic events or phenomena. This research can be characterized by the following:

- A focus on a problem or issue to be investigated
- A systematic process of inquiry
- Development of explanations that lead to increased understanding.

Action research provides the means to systematically investigate and design more effective solutions to the complex array of issues at work in any social setting. The very first purpose of action research is to provide the possibility for people to engage in systematic inquiry and investigation to design an appropriate way of accomplishing a desired goal and to evaluate its performance. Action research results not only in a collective vision but also in a sense of community. It operates at all the levels: intellectual, social, cultural, political, and emotional. (Stringer, 2013).

As a researcher, using action research methods, I am aiming to get involved all people

Figure 1. The Action research cycle
in my organization who are affected by my business problem under study as well as experts and professionals in order to work together formulating constructive analysis of the problem and creating the solution and validating it by collecting feedback and continuously reflecting. It is not an easy process, which requires trust from all the participants and which is important to conduct in the positive working atmosphere.

2.2 Research design

Research design reveals from chosen theoretical perspective – interpretivism and followed by qualitative research methods used. According to Holstein & Gubrium (2003) cited in Swanson & Holton (2005), qualitative methods create the venue for a new reality as that reality is discursively constructed via the “conversation with a purpose” that is an active interview. The rational for qualitative method is based on this research nature and ability to reach the research objective.

Data collection methods in my work: observations (formal and informal) and semi-structured interviews with the questions prepared ahead of time.

I have started my research with observations as a pre-step in order to find out business problem and to be sure that there is a need for change as well as to understand the current business processes in a new for me organization. Moreover, plural data collection instruments would help getting richer data and accurate research findings. Observations and interviews supplement each other and I am using these methods of data collection during current state analysis, building conceptual framework and final proposal phases of my work.

Kvale (1996) points out that due to the fact the events are not often directly ‘observable’; talking to people would be one of the most effective methods for attaining and exploring such constructs. More specifically, as interviews are interactive, interviewers can enforce for complete, clear answers and can probe into any emerging topics. Hence, interviewing is expected to expand the scope of understanding investigated phenomena, as it is a more naturalistic and less structured data collection tool. According to Kvale (1996), an interview is “a conversation, whose purpose is to gather descriptions of the [life-world] of the interviewee” with respect to interpretation of the meanings of the ‘described phenomena’.
Three interview techniques are used in my work:
- Face to face
- Telephone
- Email

While first two techniques are distinguished with synchronous communication in time and place, last one is of asynchronous communication. Even though that first two apparently give me the advantage of social cues, I cannot admit that I have received not full information from my email interview. I had possibility to come back to interviewee asking for additional explanations if any issue was unclear and left uncovered. All respondents were experts in the field and social cues such as voice, intonation, body language were less important for my research.

Thematic content analysis of received answers is used to find common patterns across a data set.

The primary charge during qualitative research is to capture, understand, and represent participants' perceptions and meanings through and in their own words (eds. Swanson & Holton 2005). Two specific methods I will use to surface and clarify my worldviews and assumptions so as to not cloud my understanding of participants' meanings: writing personal statements prior to start the research and memos to myself during data analysis. And come back to them reflecting how I am influencing on the process.

My research design is presented in Figure 2 below. Every stage of the process is explained more in detail in its own chapter.
2.3 Validity and reliability of this thesis

According to Leung (2015), "validity in qualitative research means “appropriateness” of the tools, processes, and data. Whether the research question is valid for the desired outcome, the choice of methodology is appropriate for answering the research question, the design is valid for the methodology, the sampling and data analysis is appropriate, and finally the results and conclusions are valid for the sample and context."

The essence of reliability for qualitative research lies with consistency. As data were extracted from the original sources, researchers have to verify their accuracy in terms of form and context with constant comparison, either alone or with peers (a form of triangulation). The scope and analysis of data included should be as comprehensive and inclusive with reference to quantitative aspects if possible. Most qualitative research studies, if not all, are meant to study a specific issue or phenomenon in a certain population or
ethnic group, of a focused locality in a particular context, hence generalizability of qualitative research findings is usually not an expected attribute (Leung, 2015).

Doing my research I was aiming to understand the root cause of business problem and used sound and appropriate methodology, facts and true information while finding the approach to solve it in my case company. At the same time extrapolating so that my findings could be used by the stakeholders outside of my company. As well as multi source triangulation was used in order to increase the level of knowledge. That is why this research can be identified both as reliable and valid.

3 Current state analysis and ideal state

In this chapter I will explain my steps to determine the current state of freight spend monitoring in the company x and the route to desired destination.

Prior to improving or developing any business process it is naturally needed to understand its current state. According to Auster, Wylie & Valente (2005), although the current state represents a snapshot in time – since organizations are constantly evolving – it is important to stop and take this detailed look at “Where are we now?” to identify what is working well and key drivers, problems and root causes.

Without this type of analysis, there are three risks involved. First, well-intended change initiatives may undermine what is working good. As well as there is another problem to overlook key problems that explain the current situation. Finally, we may not uncover the root causes of the problems we do identify and as a result never find effective solutions. In all of these cases the changes might lead to less than optimal results. (Auster, Wylie & Valente 2005).

In addition to personal hunch about the current state of the organization or some particular business process, according to Auster, Wylie & Valente (2005), we also need to look to others in the organization to broaden our view. Some approaches that may be useful include employee surveys, informal focus groups, and chats. Views from external stakeholders such as suppliers, customers, and even competitors can also offer tremendous insights.
I recently joined the case company and therefore, mapping the current state is more challenging for me and time taking. I have started with observations doing my daily activities in order to understand business environment, gather preliminary information on the processes and to define and reflect better on business problem. I have found out that even though that transportation costs data is carefully collected, it is not systematically written down and stored.

I have been working in logistics for several years and according to my experience freight costs control and monitoring has always been a complex topic due to the missing visibility caused by the problems with freight spend data quality, specifically with data completeness, consistency, accuracy, validity, and timeliness. I have been always interested to improve the visibility on freight spend and would like to use an opportunity to make it true in my current company.

Moreover, business unit where I am conducting my research is a very young unit in the organization and it will be not that difficult to change the processes, if will be needed as well as it is just appropriate time.

As a next step, I had a face-to-face interview with my supply chain manager regarding the issue. The following questions were discussed:

1) What is a current system to collect freight spend and transportation data
2) Current system application purpose
3) System’s weaknesses and required state in the future.

As a result of this interview business problem was confirmed and the following strengths and weaknesses of current system stated. They are illustrated below in Figure 3.
Current tool for freight spend recordings - Freight Tracker (web based solution)

**Its application purpose:**

1) to have visibility on all the shipments
2) to centralize shipping documents archiving
3) to analyse past freight spend
4) to assure the shipments are performed according to validated shipping lanes
5) visibility on logistics activity and workload

**STRENGTHS:**
- easy way to extract and access historical shipments and spend data to excel format
- shipments data is centralized

**WEAKNESSES:**
- not all transportation data is available and the gaps in data exist
- very low freight spend visibility and not efficient freight audit capability
- no possibility of automatic spend projections and forecasts in case when goods volumes changed or new lanes are added
- no visibility on cost improvement and reduction opportunities
- not flexible with adding the fields

Figure 3. Current state analysis.

Current process of data collection to existing reporting tool - Freight tracker tool is presented below in Figure 4.
Figure 4. Current process of data collection for transportation data and freight spend analysis.

I will work on the recommendations to overcome the weaknesses identified. The ideal state would be the solution which will allow to have:

- Accurate freight spend and transportation data centralized and visualized
- Freight audit
- Cost analysis
- Costs projections for the future.

During the discussion with my manager (supply chain operations) it was agreed that it will be good to have in scope also the monitoring of some supply chain key performance indicators (KPIs) used in the company to make the processes more efficient.

Later on I had an interview with company’s Process excellence Lead regarding the existing IT tools in the organization for visual analytics. It was found out that there is TIBCO Spotfire Business Intelligence platform in house. The data visualization features of Spotfire are among the best in the business intelligence class of tools.
I had also an opportunity of a discussion with supply chain director of my business unit, who confirmed the need of freight spend visibility improvement. As well as, he informed me that data visualisation and analytics software (Spotfire) implemented in the company does not have Freight spend dashboards, there is an intention to use the tool in my business unit and visualization of transportation and freight spend data is a good start with. However, at the same time with my work on my thesis there are projects at the for BI analytics introduction for other functions and departments. Some insights could be taken from the experience from other business units could be taken from those projects.

Later on I had a preliminary discussion with company’s information manager regarding the existing tool. He confirmed that it is an excellent dashboards tool which can correlate and pull in many data sources to be able to analyze. The tool is actively used by other business units for other business processes.

In order to understand planned volumes for freight spend forecasts I had an interview with demand planners. The data is extractable from ERP system. As well as the shipments are usually very standardized making calculation of the cost per kg per lane very easy identifiable.

After the discussion with my manager (supply chain operations) it was identified that the solution for transportation data and freight spend visibility should be flexible enough to allow simply adding there other functionalities in the future. For example, monitoring of some supply chain key performance indicators (KPIs) used in the company to make the processes more efficient. This is should not be a problem for Spotfire software.

4 Conceptual framework

Transportation plays a key role in supply chain design, strategy development, and total cost management (Coyle et al., 2012). Coyle et al. (2012) state that company leadership must consider transportation issues when developing organizational plans, integrate transportation into supply chain processes, and optimize total supply chain cost rather than minimize transportation costs. While transportation can provide valuable support to organization’s supply chain, it is a mistake to assume that this role can be accomplished with ease. There are numerous obstacles – supply chain complexity, competing goals
among supply chain partners, changing customer requirements, and limited information availability – to synchronizing transportation with other supply chain activities.

According to Goodwill (2017), freight transportation is typically the largest cost component of supply chain management. Data from Logistics Management’s Annual Study of Logistics and Transportation Trends specifies that an average transportation spend is in the range of 10 to 11 percent of revenue for companies with less than $250 million in sales and it is in the range of 2 to 3 percent for companies with revenues in excess of $9 billion. Thus, freight expenses can not stay undermanaged. In spite of the mode, freight costs are usually consist of three components:

- line haul costs
- fuel costs
- accessorail costs.

The actual freight cost includes elements for pick-up, cross-docking (if small parcel or LTL freight), linehaul (point to point) transportation and delivery to the customer being the largest component of shipping costs. Included in this expense are all the expenses associated with administration (data entry, proof of deliveries, billing, for example). For small parcel and LTL shipments, the freight cost is bounded up with the space taken on the linehaul unit and the total weight of the shipment (Goodwill, 2017).

Fuel cost is usually the second largest component in freight costs. They might appear as a surcharge on the carrier invoice or it may be directly cut-in the line haul rate. The surcharge formulas and discounts vary from carrier to carrier and are typically tied to the cost of diesel fuel (Goodwill, 2017).

Goodwill (2017) state also that any services not included in the line haul rate or fuel surcharge can be refered as accessorail charges. They usually consists of the costs for deliveries to job sites or apartment buildings, redressings to different locations, driver waiting time, demurrages, trailer detention and a host of others. Over the past few years, carriers have become more focused and aggressive in capturing revenue for these services. All of these parts of freight transportation have to be managed, controlled and negotiated carefully and on an ongoing basis (Goodwill, 2017).
Coyle et al. (2012) argue also that unstable transportation rates present one of the major concern for organizations. Freight carriers are now in a strong position to increase rates to cover the rising costs of fuel, labour, and other expenses.

Goodwill (2017) lists some of the signals of over spending on freight in the organization:

- No granular freight transportation budget
- High claims expenses and/or high cubing charges that may reflect poor packaging or loading processes
- A knowledgeable person is not managing freight transportation expenses
- Shipper does not know the density of its freight
- Company has no method of managing fuel surcharges
- No request for partnership conducted in the last 3 years
- Too many carriers being used which results in poor leveraging and high costs
- Freight management is fragmented and managed by each individual branch without strong head office oversight and control
- Poor modal management (for example, truck used when rail service would be more cost effective)
- Extensive use of expedited freight carriers (signaling poor production processes)
- Overflow or late shipments are given to an incorrect mode or carrier service provider (for example, small parcel shipments given to LTL carriers)
- No shipment consolidation (for example, multiple individual shipments going from the same origin to the same destination on the same or consecutive days)
- No transportation management (TMS) software to manage the business
- No ongoing compliance tracking
- No scorecard or KPIs to measure actuals against standards or objectives
- No granular shipment activity data base (Unfortunately, the data remains in files as paper invoices that are not entered into a data base so they can be scrutinized and actively managed.)

Many companies have transportation data, but the constraint is that when it is of poor quality, not standardized according the business needs and not having all the necessary components and structure.
4.1 Transportation and freight spend data

In order to drive down logistics and transportation spend, the very first thing needed is freight and transportation data to be in good quality.

According to Fay (2012), good quality data is the decisive basis for the successful financial management of freight transportation and its visualization. It is obvious that many organizations operate with unclear pictures of their total transportation costs and that there is significant room for improvement.

Most of the data available in the organizations comes from internal systems and, especially in the case of indirect and services spend, lacks line-level detail that only comes from specialized procurement tools and supplier-provided invoice data. There are other sources of data: purchasing card files, archived EDI information, supplier networks, banking data, group purchasing organization information, trade financing archives and other third parties can often provide data as well, although it’s usually in pieces, not complete and fragmented (Busch, 2016).

According to “Canadian shipper” (2011), shippers with poor quality shipping data and inaccurate freight cost data place themselves in a vulnerable position. Gathering information on all supply lanes is a great place to start, but this data collection is not enough. Here are some important points to take into consideration:

- **Freight Density:** shippers that do not have a good grip on the volume of freight being transported at different densities place themselves at the mercy of carrier costing evaluation studies

- **Mode:** freight databases need to capture the mode used. This data allows companies to detect patterns that are indicative of production problems, inventory shortages or overzealous sales personnel

- **Segregation of Freight Charges:** a good freight database contains segregated line-haul costs, fuel costs, duties, itemized accessorial costs and taxes. It allows companies to have visibility into the application of fuel surcharge formulas, to identify currency surcharges and processing fees and to see any patterns of extra charges that may be indicative of poor business practices or unscrupulous carriers. They may also indicate that certain carriers are applying incorrect rates or
issuing balance dues to see if they can secure duplicate payments from shippers with weak accounting systems

- Transit times: service performance is critical to the success of many companies in this highly competitive world. A well-structured database contains the origin and destination of each shipment, including zip codes and postal codes, the port of entry and the carrier. They allow shippers to track actual versus promised service levels to see where there are breakdowns."

It is important for the organization to understand the concepts of static and dynamic freight optimizations. Static optimization relates to freight transportation activities and decisions using fixed data, based on historic trends, versus dynamic optimization of freight spend or the process of applying real-time solutions using live, variable sets of data for their procurement decision-making. Dynamic optimization is perceived as a solution for improving decision support processes, optimizing costs, modes, routing, loads, real-time shipping optimization and attaining ideal flexibility for shipping activities (Peerless Research Group, 2013).

Busch (2017) summarizes that the most common theme coming out of initial spend analysis exercises is that data quality is poor - and the suppliers might have better data about the organization than own systems can provide. But this is where the right technologies can come into play to help. Best practices (of which there are many, beyond this list) here include:

- Creating efficiencies of scale in data loading and normalization (especially for repeat/refresh situations)
- Pursuing a permanent (sustainable) solution versus one-time efforts - with at least quarterly data refreshes, but ideally monthly or even weekly
- Having an automated approach to cleansing and classification (machine learning/AI, rules, etc.) with human expertise layered on top of it (if the technology is not sufficient alone to get to the level of accuracy required, which is the case in over 90% of spend analysis efforts). This includes being able to address naming inconsistencies and conventions; missing data; incorrectly entered data; applying the right taxonomic structure to underlying datasets (e.g., “mouse” as a computer peripheral vs. a laboratory consumable), etc.
- Getting to line-level detail
- Offering predictive coding/analysis — even (potentially) classifying data in real time at the point of requisition
- Providing standard data enrichment options (for company level fields — think “Hoovers” type information)
- Providing secondary/advanced data enrichment (for supply risk, corporate social responsibility data, supplier diversity, etc.)

If to carry out these activities at the proper level together with the actions of manual data cleansing, it will be possible to generate a timely, core spend master data set that is continuously updated and available. To which extent automated or manual approach is used depends on affordability and will vary from business to business. But only having complete and accurate transportaion data it is appropriate to identify opportunities and take action - the visual display of spend information.

4.2 Visualizing freight spend data

To appreciate the power of any process visualization and freight spend in particular, crucial is to discuss and understand the current state of visibility. Visibility is about seeing what is happening at any point in time in order to properly monitore and manage it. Visibility is significant as a first step, but it gives a general idea of the status at a specific point in time. While it has certain details, it is lacking in others. Visualization provides full context of the process over time and creates the environment for the users to extrapolate decisions and initiate actions (Blinick, 2017).

For decision-making process the managers require more than just data. They need the information that only comes when data is analyzed and presented with contextual intelligence. Having this kind of tool allows the company to move to the next level of supply chain visibility or taking data, no matter how complex, and presenting it in a way that allows real decision making – visualization (Legacy Supply Chain Services, n.d.).

The desired target of visualization is to get insight, by means of interactive graphics, into various aspects related to some process we are interested in, such as a scientific simu-
lation or some real-world process. In most applications, the path from the given process to the final images is quite challenging and includes a series of elaborate data-processing operations. And finally, the visualization process produces one or several images that should be able to convey insight into the considered process (Telea, 2015).
Recognizing the need to combine visualization solutions with data analysis and data mining front-ends, a new discipline has emerged from the traditional information visualization and scientific visualization, and data-mining communities: visual analytics. The central goal of visual analytics is to provide techniques and tools that support end users in their analytical reasoning by means of interactive visual interfaces (Telea, 2015).

To conclude, visualization of supply chain is based on two fundamentals:

1) the aggregation of supply chain (including freight spend) data elements into a singular data repository
2) reporting capabilities that allow the presentation of data in a contextual graphical output.

It is simple with the correct tools. With the help of advanced algorithms and business intelligence (BI), freight spend management solutions deliver exceptional visualization of the entire supply chain of the company from both a predictive and historical perspective. When visualization is enhanced with reporting, alerting, analysis and decision support, the solution is dramatically more powerful than simple visibility.

4.3 Visual analytics tools for supply chain

Modern technology and data analytics can provide freight and transportation data visibility transforming supply chain continuous improvement into a day to day operational process instead of a once a year strategical exercise. Advanced analytical and visualization tools are available within Business Intelligence (BI) solutions. Howson (2008) states that like the eyes are the windows to the soul, BI is a window to the dynamics of a business. It reveals the performance, operational efficiencies, and untapped opportunities.

According to Partridge (2013) companies are most attracted to supply chain BI tools for their coveted ability to make sense out of the seemingly endless array of data that has become available through the continuing adoption of logistics technologies such as transportation management system (TMS), warehouse management solutions (WMS), and supply chain execution systems. While access to data is key, being able to find, understand, and use that data to make strategic decisions that improve supply chain effectiveness is crucial.
I would like to pay a separate attention to TMS. McCrea (2018) states that TMS consistently stand out as one of the best tools for streamlining the transportation component of the supply chain. Acting as the logistics management “hub”, TMS handles route planning and optimization; freight audit and payment; order visibility; carrier management; and other determinative functions helping shippers digitally manage and optimize their transportation networks. Historically offered as an on-premise software application, TMS has since largely moved into the Cloud. Thus, it provides real-time, all the time conducted together among the shippers, carriers, trading partners and customers. It also eliminates its biggest disadvantage – high cost and make it available also for small to midsized (SMB) shippers.

McCrea (2018) also note

If there is one factor driving more shippers to adopt TMS – it is the strong return on investment (ROI) that these solutions offer to companies of all sizes. In its most recent “TMS Market Research Study,” ARC Advisory group says companies report an average savings of approximately 8% with the use of a TMS application. Of these savings, nearly 60% of users indicated that less than 10% of the net savings were absorbed by the TMS. These freight savings can be attributed to simulation and network design, load consolidation and lower cost mode selections as well as multi-stop route optimization.

However, advantages and visibility provided by TMS are not enough nowadays for the shippers that are seeking not only best execution and optimization, but a greater insight in order to drive strategic, proactive decision making in supply chain. In case the company currently uses a TMS, it is likely that this software alone is filled with an abundance of data that can be used to answer more complex logistics questions. Important is to unlock that reservoir of data, analyzing it, organizing it, representing it and delivering the transportation intelligence needed to the appropriate stakeholders (McCrea, 2018).

According to Sage (2017), the most effective BI solutions can harness the torrent of data flowing through a TMS and transform that data into usable knowledge and insights that can shine a spotlight on areas for improvement, monitor key performance indicators, and answer the most critical transportation questions. Logistics professionals who adopt a BI solution no longer have to extract data, pull it into a spreadsheet, and sort through it manually.
Partridge (2017) argues that today’s BI tools are taking that extra work, offering up data in easy to understand and digest informational formats, presented in a more visual way. And states that BI tools for supply chain users can be categorized as

Reporting: BI reports are far more detailed and dynamic than in the past. They display all the data about transportation providers as usable information, in a scorecard format, which help users determine how well carriers are performing overall.

Real-time dashboards: managers and executives who want a quick, daily overview of what is happening in their transportation or supply chain network use dashboards, which provide information in near real-time to help users catch and solve problems as they occur.

Benchmarking: comparing data on factors such as freight rates and on-time delivery percentages against peers allows companies to get a more complete picture of their performance in the marketplace.

The methods shippers use to put BI information to work range from simple to complex. Some shippers use BI tools simply to categorize their transportation costs at a more granular level than they have historically. On the more complex side, companies can utilize BI tools to further drill down into the supply chain, and drive out even the smallest inefficiencies (Partridge, 2017).

According to Rist & Baker (2018), BI applications are the ones that process not only numbers nowadays. These tools also examine those numbers into innovative visualizations that not only help people to process information more quickly but can actually discover new value-added data insights as well.

Data visualization is not something very new, because pie charts and line graphs have existed also earlier. But impressively different now is the kinds and size of data that can be represented this way and how promptly and easily the users can manipulate with it.

In the case of BI apps and analytics, data visualization is the crystallization of numeric algorithmic outputs into images. The goal of such imagery is to quickly transfer information from the machine to the human brain, not only efficiently but also in the most meaningful manner possible. Therefore, it is not the aesthetic value of a visualization that counts but the clarity of the message it conveys (Rist & Baker, 2018).
Rist & Baker (2018) also argue that the large part of BI tool are capable of data visualization operations. However, companies looking to really exploit data visualization should look at these tools carefully and exclusively through that lens before making a buying decision. After all, sometimes the right tool to parse the data may not offer a sufficient visualization palette for business needs. There might be needed to invest in a combination of tools in order to get both the analytics and the visualization.

Data visualization is a visual depiction of information. It is imagery dedicated exclusively to messaging or presenting information. Data visualization tools can automatically create visualizations, helping user to create own, or offer both capabilities. On one hand on the market exist simpler and even free data visualization tools. They are dedicated to building infographics rather than performing sophisticated data analytics. For example, some of these tools include Tableau Gallery and also Microsoft Power BI. At the higher end are tools that can change visualizations on the fly, in the same way that outputs from sophisticated algorithms change after repeated direct querying of real-time data (streaming data) and across multiple data sources (Rist & Baker, 2018).

Rist & Baker (2018) state also that

Ultimately, data visualization capabilities are used to build dashboards. Sometimes the dashboard represents a single, data-based story that is significant to many viewers. Or the dashboard may contain many stories for the benefit of a single user. Dashboards sometimes come with visualizations that are pre-set and fixed in place. Other times the dashboard’s visualizations come with various display options or images that are customizable. Sharing can often be customized too, such as according to permissions, per business line, per job role pertinence, or even by personal preferences. In any case, the dashboard typically contains two or more data visualizations meant to inform and sometimes even prompt a business action or decision.

With regards to BI dashboards, according to Rist & Baker (2018), the key value is typically three-fold:

1. They do not require database expertise to use. It is only needed (though not always) database professional’s help to set them up and connect them to all of the data sources.

2. Almost all of them can act as a unified front end to multiple databases and data types. This is primarily due to the rising popularity of Big Data, which is typically a combination of relational data (generally SQL-based) and unstructured data found in disparate sources both inside and outside the company’s walls. By providing support for various kinds of data, these tools allow folks without database expertise
- but with direct, front-line job experience - to ask questions directly against the organization's data.

3. These tools can also build live data visualizations and dashboards themselves rather than forcing a separate operation from company's programmers or IT staff- ers. Those visualizations can be exported as flat graphic files or as code snippets that can be just copy and paste onto webpages or team websites. Dashboards can also be directly shared, oftentimes even with users who are not using the BI app.

These features are apparently more powerful than what it is possible to get using tradi- tional spreadsheet analytics.

Data visualization can be defined as “the pretty face of data analytics.” That can be in- valuable for some organizations but completely unnecessary to others. If strong ad- vanced analytics is what organization needs, then it is better to evaluate BI tools based more on their number-crunching capabilities than on their visualization features. But if the objective is to bring an easier yet deeper view of all the data organization is collecting to a wider swath of the employees and managers, then data visualization is of prime importance. Just to remember that not all people understand all images easily. People learn and ingest information in different ways. The key is to understand the audience and pick visualizations that work best in communicating with that audience (Rist & Baker, 2018).

4.4 Transportation and freight spend forecasts

Freight spend forecasting and budgeting are clearly highly important for the company, should be done as accurately as possible and help guide supply chain managers towards achieving supply chain objectives.

According to Byrne (2010)

transportation forecasts allow the planners to shift from reacting to orders to pro- actively managing capacity. By synchronizing transport forecasts with manufactur- ing and distribution plans, the entire company can respond to the same demand signals. A successful transportation forecasting solution must generate a forecast that is not only tied to the corporate demand plan, but also provides the granularity required by transportation. It might be by lane, mode, protection class, carrier. The solution must have visibility into promotions so that planners can adjust shipments in advance of promotion-induced spikes in demand. It should also reflect current manufacturing and distribution capabilities and strategies, and should not be based on historical averages. All currently available demand signals, including POS,
should be used to ensure the most accurate shipment forecast. The solution must also be flexible enough to evolve as manufacturer and distribution capabilities change.

Byrne (2010) also state that visibility into upcoming transportation requirements enables manufacturers to map the capacity problems in advance, giving logistics the time to resolve them. Visibility into future shipments and inbounds makes better the warehouse staffing. Separating truck procurement from order creation both lowers costs and improves responsiveness. Forecasts that match current manufacturing and distribution capabilities and strategies generate more effective strategic sourcing and give manufacturers the opportunity to collaborate with carriers and retailers, benefitting manufacturers, retailers, carriers, and consumers. Transportation forecasts can be integrated with TMS and WMS to further improve efficiency. Manufacturers can cut expenses, improve the level of service, and increase sustainability by forecasting transportation requirements rather than just reacting to orders.

4.5 Usage of metrics to analyze transportation costs

I put this topic as last one in my literature review because in the beginning I was not planning to include it in the scope of this thesis. But I strongly believe that simply tracking or even simulations with the freight spend data is not enough to make a difference within an organization.

Practical applications of big data in transportation require shippers to set goals, understand the metrics they are measuring, and most of all, take quick and decisive action on the data available (PLS Logistics, 2016).

According to Robinson (2014), a shipper has to consider the appropriate transportation metrics to track and understand. Using them can lead the company to understand if they have the proper balance between the cost and service. Using the correct transportation performance metrics will not only let the managers know the current performance, but will also lead to change processes to become more efficient. Transportation measures of effectiveness should be considered critical to any improvement plan. It also allows for comparison to other companies through like industry benchmarking.

Robinson (2014) further notes:
“- Certain metrics, have a widely accepted definition. Other metrics may need to be customized for particular industry or logistics business model.

- Measurements alone are not the solution to weak areas. The solution lies in the corrective actions that are taken to improve the measure. The solution comes from process or system improvements. The measurements should be used to track the results of the improvement efforts.

- Tracking transportation metrics should have an owner. This needs to be a person or department that is responsible for achieving an agreed-upon target on the metric.

- Management needs to adopt, encourage, and support the process changes to achieve the desired targets.”

Robinson (2014) also defines transportation metrics that matter the most:

- Freight cost per unit shipped: Calculated by dividing total freight costs by number of units shipped per period. Useful in businesses where units of measure are standard. Can also be calculated by mode (barge, rail, ocean, truckload, less-than-truckload, small package, air freight, intermodal, etc.).

- Outbound freight costs as percentage of net sales: Calculated by dividing outbound freight costs by net sales. Most accounting systems can separate “freight in” and “freight out.” Percentage can vary with sales mix, but is an excellent indicator of the transportation financial performance.

- Inbound freight costs as percentage of purchases: Calculated by dividing inbound freight costs by purchase dollars. It is important to understand the underlying detail. The measurement can vary widely, depending on whether raw materials are purchased on a delivered, prepaid, or collect basis.

- Transit time: Measured by the number of days (or hours) from the time a shipment leaves your facility to the time it arrives at the customer’s location. Often measured against a standard transit time quoted by the carrier for each traffic lane. Unless you are integrated into your customers’ systems, you will have to rely on freight carriers to report their own performance. This is often an important component of lead-time. Transit times can vary substantially, based on freight mode and carrier systems.

- Claims as percentage of freight costs: Calculated by dividing total loss and damage claims by total freight costs. Generally measured in total and for each carrier. A high number generally indicates packaging problems, or process problems at the carrier.

- Freight bill accuracy: Calculated by dividing the number of error-free freight bills by the total number of freight bills in the period. Errors can include incorrect pricing, incorrect weights, incomplete information, etc. Generally measured in total and for each carrier.
• Accessorials as percent of total freight: Calculated by dividing accessorial and surcharges by total freight expenditures for the period. Many freight carriers will charge extra fees for trailer detention/demurrage, re-delivery, fuel increases, and other expenses or extra services. Often, these are extra costs incurred due to inefficient processes.

• Percent of truckload capacity utilized: Generally used for shipments over 10,000 lbs. Calculated by dividing the total pounds shipped by the theoretical maximum. For example, assume your trucks can hold 40,000 lbs. of product. During the prior month, there were 675 shipments totaling 22.95MM lbs. The percentage utilization was 85%. The 15% unused capacity is an opportunity for more efficiency.

• Mode selection vs. optimal: This is calculated by dividing the number of shipments sent via the optimal mode by the total number of shipments for the period. To measure this, each traffic lane must have a designated optimal mode, based on freight costs and customer service requirements.

• Truck turnaround time: This is calculated by measuring the average time elapsed between a truck’s arrival at your facility and its departure. This is an indicator of the efficiency of your lot and dock door space, receiving processes, and shipping processes. This also directly affects freight carrier profits on your business.

• Shipment visibility/traceability percent: Calculated by dividing the total number of shipments via carriers with order tracking systems, by the total number of shipments sent during a period. This is an indicator of the relative sophistication of your carrier base, and one measure of the non-price value available from your carrier base.

• Number of carriers per shipment: Calculated by counting the total number of freight carriers used in a given period, by shipment. This is an indication of your volume leverage and control over the transportation function.

• On-time pickups: Calculated by dividing the number of pick-ups made on-time (by the freight carrier) by the total number of shipments in a period. This is an indication of freight carrier performance, and carriers’ effect on your shipping operations and customer service.

4.6 Interviews on the freight spend issues with the experts

The texts chosen for conceptual framework analysis should effectively represent the relevant social, cultural, political, and environmental phenomenon or social behavior, and the multidisciplinary literature that focuses on the phenomenon under study. An important point is they should also represent practices that are related to the
phenomenon. The data should therefore come from a variety of types, such as books, articles, newspapers, essays, interviews, and practices (Jabareen, 2009).

I have decided to undertake standartized, open-ended interviews with practitioners – specialists and experts in logistics field in order to strenghen and validate my conceptual framework and the research problem. Thus, a theory or a theoretical framework portrayed the research phenomenon will be active and may be revised according to new insights and comments received.

I have conducted 3 interviews (interview questions are presented in Appendix 1) with Logistics and Transportation Managers from international manufacturing organizations operating in different industry than the case company, but similarly having global supply chains. Interviews were hold by email, by telephone and face to face. In case of last two ways, I have created the questions before the interviews and sent them to participants via email, so that they could be prepared. I have been carefully following my questions during interviews, patiety giving the respondents possibility to express themselves and accurately recording the responses. I was very satisfied with the results received from the interviews: the respondens were gladly sharing their opinions and the answers were large.

I have analysed interview transcripts using thematic analysis and below (Figure 5) are presented collated data results and code words identified as important features relevant to answering the research question.
1) Challenges in regards to freight spend control
- Lack of visibility on global frame agreements' terms and conditions in the organization business units.
- Transportation data is fragmented or is absent and inaccurate. Freight spend control is based on suppliers' transportation costs reports.
- Freight spend in ERP as total cost, not subdivided by modes or other freight cost parts.
- Additional transportation costs are not charged separately or charged with a delay.
- Freight spend is not allocated to materials or sales orders, booked to general account and hidden into general costs.
- Transportation booked by 3rd party (e.g., suppliers, contractual manufacturers) is more expensive.
- Structured freight spend control process is missing.
- Freight invoices are not in auditable and harmonized form, do not comply with statutory provisions, might be without references and etc.

2) Value for the company from proper freight spend control and forecasting improvement
- Better transportation planning per lane and problems solving.
- Massive improvements for RFQ cycle times.
- Better performance and possibility for savings.
- More clear and precise prices for products.

3) Quality of the freight spend data
- Estimated for some lanes and some real data - not accurate.

4) Freight spend data sources
- No special tools to extract the data, everything is based on excel and suppliers reports.
Figure 5. Collated results from the interviews with Logistics and Transportation Managers.

To summarize, the key themes from the interviews:

- transportation and freight spend data, its current collecting and auditing processes – there is a need for attention and improvement;
- by improving freight spend visibility, especially with the help of appropriate BI tool significantly better performance of the whole supply chain can be achieved.
4.7 Conclusions

Many organizations function with unclear pictures of their total transportation costs and without freight spend forecasts. Consequently, significant corrections of the processes are required. Accurate freight and transportation data is particularly highly important and the very first step in the improvement process. It is recommended to access the quality of the data and the current state of the freight spend management carefully. For freight data to be fully effective, it must include all of the standard fields, must be audited on an ongoing basis and the erroneous data should be corrected and the gaps eliminated. By doing that companies will gain the opportunity to evaluate its traditional data sources and refine the method how the transportation and freight spend data is provided to the management.

However, just visibility of the past trends is not enough nowadays, it is crucial to have business-ready real time data presented in an understandable form and allowing to generate instant reports and do projections with the data in order to support decisions to be made on the fly. New data visualization technologies and powerful logistics analytics solutions are opening new insights for best-in-class shippers to find freight spend optimization opportunities and drive performance improvement.

It is very important for the company though to obtain a BI system scaled to company’s objectives and business needs. Such a tool is a benefit to any firm and it will pay for itself allowing the users to see transportation and freight data integrated from numerous information sources and to easily monitor the metrics and key performance indicators (KPIs) that contribute to the success of supply chain and the whole business.

5 Building the proposal

We learned in the previous parts of this work that the process of freight and transportation data visibility development or improvement is of a significant value for any company. However, it is a large project, touching many aspects, of driving the organizational change, which is always challenging. That is why in order to succeed, it requires a disciplined approach, the team of inspired and motivated people – supply chain professionals involved and strong leadership.
I have prepared my proposal based on current state analysis in the case company, conceptual framework and the results analysis of the interviews with Logistics and Transportation managers. While I was working on previous parts of this thesis and reflecting on the topic, I have also identified some highly important issues and processes that necessarily should be refined as well, before or in parallel with the main suggested steps towards the objective of this work – transportation and freight spend visibility improvement.

I recommend to proceed with the following steps:

1) To start the improvement with the data. Transportation data is the key to unlock the value and the base for future visualization and projections in BI tool. Prior to starting transportation and freight spend visibility improvement, it is crucial to analyze the data, answering the following questions:

- What data exist on transportation and freight spending?
- Are there gaps or overlaps in these data, is it detailed enough for a particular company’s supply chain objectives?
- Is the data presented as useful to make better business decisions or improve business practices?
- How the accuracy of the data could be improved?

For my case company I would suggest the following regarding the current freight spend data source system – Freight tracker sharepoint:

- To check if all standard fields are in place and information entered is detailed enough (a good freight database contains segregated line-haul costs, fuel costs, customs duties, itemized accessorial costs and etc.) for granular costs monitoring and budgeting
- Proper system guides should be implemented along with individualized training to mitigate possible bad data entry
- In order to achieve accurate and timely quoted versus finally billed information in the system, listed below freight audit improvements actions will be needed.
Freight audit improvement actions:

a. Request for quotation and final rates: harmonization of cost break down structure of the rates with freight forwarders;
b. Single local currency in final invoices (plus automated currency converter in Freight tracker)
c. All final rates should be found at intra web site sharepoint and all the changes in the agreements should be updated by the person responsible without delays
d. Set up of the timeframes to the freight forwarders for the receiving of the invoices to eliminate late invoices
e. Separately should be invoiced only extra charges agreed in the contracts (for example, extra lease days) for extra charges analysis
f. Freight calculator option on the web (a part of shipments projections feature)
g. To streamline and simplify suppliers invoices management process by purchasing a cloud-based e-invoicing, e-procurement and financing software and services solution or investigating if similar software is already in use within the company and implementing it to own BU.

By refining the data inputs we will have as an outcome structured spreadsheets to upload origin-destination pairs, projected freight volumes, current rates and fees, and other meaningful data into BI system for future freight spend analytics, visualization and simulation.

2) Transportation and freight spend forecasting process by lane/mode/carryer/day/cost per kg should be implemented in the company. It will be done based on the upcoming campaigns information from the demand planners, extracting the data from ERP and imposing on cost per kg / per lane.

3) Scorecard or KPIs to measure actuals against standards or objectives should be developed. They vary from company to company. For the case company I would recommend to implement and set up targets for

- Freight cost per unit shipped
- Outbound freight costs as percentage of net sales
- Freight bill accuracy: number of correct invoices from freight forwarders vs all freight invoices
4) For more insights from transportation and freight spend data BI tool – Spotfire implementation from the case company’s head quarter to BU in question and working with information manager on the reporting requirements, the exact analytics needed to BI tool, dashboards and projections.

5) Education and adoption. Continuous trainings should be implemented on the new processes (including BI tool) and ideas sharing in the department for future improvements.

6 Final proposal and its validation with informants

I have received a very positive feedback from my manager on the recommendations and suggested steps presentation and a green light to proceed with them. Presentation is illustrated in Figure 6 below.

![Figure 6. Transportation data and freight spend visibility improvement project’s presentation.](image)

While transforming my ideas into action I am planning to include the people responsible as much as possible and will work with them closely in order to adjust initial scenarios immediately if it will be needed in order to reach the objective.
Due to the fact that implementation of the proposal is intended to be a long-term project and my research is time-limited, I have possibility to validate only immediate steps of my proposal. I will list them below, explaining what have been done and what have been learned.

The work on the data cleaning and freight tracker tool layout will be conducted in close collaboration within the supply chain department team. Team’s comments have been already given during the first meetings – processes alignment, but the idea is for members to test immediately new implementations and exchange the experiences and opinions during regularly meetings. This kind of constant brainstorming will allow creative solutions developing.

It was agreed to check and eliminate existing gaps in the past transportation data information. Standard fields were revised and the way how to insert the data implemented. Deadlines are set up for these tasks completeness.

Implemented changes work very well when new shipments are created.

Separate process review will be needed with Accounts payable regarding freight billed data from the freight forwarders invoices. At the same time, with the involvement of Global Logistics, harmonization of cost break down structure of the rates with freight forwarders should be started. In the preliminary meeting with Global Procurement lead the plan of actions was prepared. This area of the project will include also the work for aggregating freight rates into the same location and immediate update when contracts change. The possibility of freight calculator is under discussion with Global Logistics.

The guidelines were given to me on the key contact persons regarding the freight audit improvement steps for cloud-based e-invoicing, e-procurement and financing software implementation. It should be checked with other business units, if the software in question is used in the organization. An investigation in collaboration with Finance and Accounts Payable is commenced on possibility to use for freight forwarders invoices in our business unit.

Together with the supply chain managers and planners in the department, volumes per lane information was extracted from ERP. ERP is not the only and not the first source for the demand forecasts data.
In collaboration with Finance Analyst I am working on the possibility to implement the metrics for transportation costs measurement. It should be in line with Global Logistics transportation metrics system used in the organization. The outcome will be taken in the future dashboard for visualization in BI tool. It was highlighted the need of KPIs for benchmarking.

Very exciting part of my work is freight spend analysis, forecasts and transportation metrics dashboards creation in BI tool. I have started the meetings with information manager regarding

- current process of the data flow mapping in a very detail
- final users and their requirements for future dashboards and reports
- information updates frequency

I parallel the initiative should be highly supported and functionally managed by Global Logistics. I will coordinate the work accordingly with Global Logistics.

I really hope that with the recommendations designed in this thesis the ideal and desired by supply chain managers will be reached in my case company - foundational/advanced drillable dashboards, power-user analytics and a flexible information architecture.

I should mention that trainings will be needed for the users for BI tool and the right mindset developing regarding the modern big data analytical tools and the opportunities that could be achieved while using them in the organization. Manually inserted numbers in the spreadsheet is the way how to work of the past.
7 Discussions and recommendations

In this thesis I have carefully researched on the topic - how to develop and improve transportation data and freight spend visibility in my case company. Having deeper understanding of freight spend profile will allow transportation costs control, potential savings by minimizing wasteful transportation spend and contributing into company’s profitability. As well as having possibility for automatic spend forecasts will drive operational decision-making, immediate shipping strategies adjustment, customer service in terms of on time delivery and demand responsiveness and sustainability.

As a final outcome of this study I have formulated a list of recommendations and steps for the improvement process, which were very positively met by the supply chain management and will be taken into action as a development project. Considering the feedback received, I have started my work on the project. However, it will be a long-term journey of continuous improvement. I suggested to start with the fundamental issue – data quality. In parallel I am actively working with the informants and the information manager regarding freight spend dashboards design in BI tool – Spotfire for my business unit.

It is a winning management decision nowadays to explore the advantages of predictive visual analytics as it is becoming a key essential in developing supply chain strategies to improve effectiveness and efficiency of logistics processes in order to achieve competitive advantage.

Changes in the process and a solution for freight spend visibility improvement were needed as early as possible in the case company’s business unit, but I strongly recommend in the long run to involve in this project other units and Global Logistics for the best practices benchmarking and harmonization of freight spend management within the whole organization.

Complex processes consist of the smaller “building blocks”, which are usually obvious components, but if not taken into consideration and refined, they make impossible for the whole system to work. It is widely discussed in the business world and not new at all that inaccurate, unorganized data create all types of problems. I have experienced it in practice, when businesses implement a best-of-breed BI solution, expecting it to solve all data problems and finally find themselves got stuck. As data quality becomes a real
challenge which really hard and costly to overcome. Though, it is never late to stop to analyse current processes and to start establishing good practices in line with the business needs and objectives.
References


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Appendix 1 Questions for the interviews with Logistics and Transportation Managers

1) What are the main challenges that you have experienced in your organization connected to the control of the freight spend?

2) Do you see any value for the company to improve the ability of controlling and forecasting the freight spend?

3) How do you access the accuracy and quality of the freight spend data in your organization?
   - Estimated data only
   - Estimated for some lanes and some real data
   - All the data is real

4) Freight spend data sources in your organization?
   - From ERP
   - Excel files and ERP
   - Any special tools for collecting freight spend / transportation data

5) What kind of tool are you currently using to monitor and forecast as well as analyze the freight spend?

6) What are the main metrics and KPIs you would propose to use for freight spend control and forecasting?

7) Any best practices that you know in the industry that you can share regarding freight spend visibility and forecasting?