



Internationalization of the selected company in Liberec region

Master Thesis

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Annotation

This thesis focuses on the analysis of the purchasing process at Knorr-Bremse Commercial Vehicle Systems and the subsequent assessment of the speed and accuracy of the various activities involved in this process. Therefore, the aim of this work is the suggestion for improvement leading to acceleration of purchasing process. The theoretical part first focuses on the definition of the concepts of globalization and internationalization, which is then described in detail using its models. Subsequently, international purchasing is divided according to the activities and responsibilities of the purchasing department. The practical part starts with an introduction of the selected company Knorr-Bremse Commercial Vehicle System, and then its purchasing department, which is partly located in Liberec. Its entire purchasing process is explained in detail, from inquiry to delivery of the first series production. The individual parts of the process are then analyzed and evaluated. In the last part of this thesis, suggestions for improving the purchasing process are given, and the impact is further quantified.

Key words

Internationalization, purchasing, purchasing process, globalization, purchasing department

Anotace

Tato diplomová práce se zaměřuje na analýzu nákupního procesu ve společnosti Knorr-Bremse Commercial Vehicle Systems a následné posouzení rychlosti a přesnosti jednotlivých činností, které se na tomto procesu podílejí. Výstupem této práce tedy je návrh na zlepšení vedoucí ke zrychlení nákupního procesu. Teoretická část je nejprve zaměřena na vymezení pojmů globalizace, a internacionalizace, který je dále podrobně popsán pomocí svých modelů. Následně je mezinárodní nákup rozdělen dle činností a odpovědností oddělení nákupu. V úvodu praktické části je představena vybraná společnost Knorr-Bremse Commercial Vehicle System a následně její nákupní oddělení, které se částečně nachází v Liberci. Podrobně je vysvětlen celý její nákupní proces od poptávky až po dodání první sériové výroby. Následně jsou jednotlivé části procesu analyzovány a vyhodnoceny. V poslední části této diplomové práce jsou uvedeny návrhy na zlepšení nákupního procesu a dále je vyčíslen jeho dopad.

Klíčová slova

Internacionalizace, nákup, nákupní proces, globalizace, nákupní oddělení

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List of abbreviations

ABS	Antilock braking systems
ACC	Adaptive cruise control
CBD	Cost breakdown sheet
DAP	Delivery at place (Incoterms 2020)
EBS	Electronic braking systems
ESP	Electronic stability program
EXW	Ex works (Incoterms 2020)
FCA	Free carrier (Incoterms 2020)
KB	Knorr-Bremse
KB CVS	Knorr-Bremse Commercial Vehicle Systems
PFMEA	Failure Mode and Effects Analysis
PPAP	Part Approval Process
PSA	Product safety audit
RfQ	Request for quotation

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Introduction

Nowadays, every process of multinational companies must be perfectly optimized to achieve a competitive advantage. All activities of the purchasing department have only been given importance in recent decades during the Globalization boom effect. Much cheaper and higher quality sources have become available. However, recent years have changed how we look at global business. What used to be an advantage is currently causing production stoppages for many automotive companies. International trade is changing, and companies must learn to respond to these situations as quickly as possible.

As many companies, so also the suppliers face material shortages, and the purchasing department is the only option how to find the sources needed for production. Fast and accurate activities must be considered as the most important for every purchasing department. Adopting it, companies may reduce or avoid the production stoppages, thus becoming a more reliable manufacturer in their business. Every delay in purchasing process may cause delivery delays that can affect the entire project timeline and subsequent sales to the customer. However, the purchasing department also has other responsibilities leading to the achievement of the company's objectives. An important part is the fulfillment of the saving targets. Thus, the reduction of purchasing costs is achieved.

This master thesis focuses on analyzing the purchasing process in Knorr-Bremse Commercial Vehicle Systems and subsequent assessment of the speed and accuracy of each activity involved in this process. Therefore, the aim of this work should be the suggestion for improvement leading to acceleration of the purchasing process. Proposals are evaluated based on a calculation of the time required to complete a specific activity. They are then compared to the current state of the purchasing process. Proposed improvements are subsequently implemented in the chosen company.

In the first part of the thesis, globalization and internationalization terms are described. It is necessary to understand globalization as internationalization is a part of it. For both terms, the definitions are stated with further descriptions. The reasons why globalization is encouraged and the resulting opportunities for companies from global business are discussed. Lastly, the main internationalization models are described. These are then used to assess the level of internationalization of the selected company.

Another part is related to international purchasing. As it was mentioned above, international purchasing nowadays plays an essential role in a company's strategic point of view. Firstly, purchasing as a whole is defined and described. The responsibilities of the purchasing department, together with its main activities, are defined. These are especially important for the company's target achievement. Furthermore, the international activities of the purchasing process are described with the aim of defining international purchasing. Its opportunities and risks are the last topics of this part. They are further implemented in the analysis part with subsequent assessment of the purchasing process of Knorr-Bremse Commercial Vehicle Systems.

At the beginning of the analytical part of the thesis is described the chosen company Knorr-Bremse Commercial Vehicle Systems. The global distribution of its locations is shown. It is divided into four regions (except for Africa and Australia) worldwide. The focus is subsequently on the Liberec locations. Its product portfolio is extensive, so only the product groups are shortly described. Lastly, the organizational structure of Liberec's location is defined by further integration of the purchasing department.

The fourth part focuses on a whole purchasing process description. Firstly, the split of the purchasing department is settled. This is important for understanding the distribution of the whole purchasing department's responsibilities and tasks among each subdivision. Subsequently, the purchasing process is stated. The process is divided by the time axis into four parts. Each part has its own activities, which are built on each other. The first part is related to the preparation process for the inquiry. The second part described the process of obtaining offers from involved suppliers. The third part aims at the process of evaluating offers, where the buyer makes a shortlist with the most competitive suppliers. The last part focuses on the awarding process, which also includes the delivery of samples and the first serial production.

In the last part of the thesis is, the whole process analyzed and evaluated. Each part is analyzed and assessed individually, so possible deficiencies are placed in a specific timeline of the process. After the evaluation process, a proposal for the improvements comes up. These contain a detailed description of proposed actions with subsequent quantification of possible time saved after implementing suggested activities into the purchasing process.

Concerning the methodology of this master thesis, the focus is on theoretical research. Thus, qualitative data are used to analyze and then evaluate the purchasing process at Knorr-Bremse Commercial Vehicle Systems. The analysis method is applied. The whole purchasing process is divided into four subgroups, which are subsequently reviewed in detail. This review is included in the fourth chapter. Based on the analysis, conclusions are consequently stated by the synthesis method. The methodological study used in chapter 5 further analyzes the proposals for the process improvement. It explores new approaches and subsequently compares them with current practices. The data used for the methodological study are quantitative and determine the processing time of each activity.

1 Globalization, Internationalization

Following chapter focuses on the theoretical background of the globalization and internationalization. Firstly, through the definitions from different researchers the globalization is explained, including the fundamental divisions, its basic points, and the example. The following is a detailed description of the main factors that force globalization, with a link to the following subsection on the reasons why a firm becomes global. Internationalization as a part of globalization, is defined with its basic patterns. The models are an integral part of internationalization, by describing its processes. Two main models are explained in detail, the Uppsala model (1977) and the model of Stopford and Wells (1972), subsequently extended by Egelhoff (1988).

The world, where traveling is too expensive and hard to manage, where companies focus mainly on their domestic markets and communication across the world only via letters or phone calls, seems to be gone. Nowadays, thanks to the internet and improved transportation, the possibilities, seems to be unlimited. These aspects have opened doors to cheap traveling, working, or studying abroad, eating exotic fruits during winter or even talk face-to-face with people on the other side of the earth at one time. These and many more aspects are included in our daily life thanks to the globalization, which is the main topic of following paragraphs. (Dicken, 2015; Malabika et al., 2016)

According to the Daniels (2015) Globalization aims on the higher interdependence of the relationships among the citizens of different countries in different parts of the world. This definition is not the only one in this book. Second definition claims, that the globalization eliminates the barriers for the benefit of international goods, services, technology, capital, or people movement, leading to the integration of world economies. People got the access to more variation of resources, products, services, and markets thanks to the widening of human connections. (Dicken, 2015; Ritzer, 2007)

The globalization is seen differently in case of Hill (2015). In general, it applies to the movement towards a more integrated and interdependent world economy. Further Hill divides globalization in two subgroups: globalization of markets and globalization of production. **Globalization of markets** means the conceiving of one huge global marketplace, by merging separate national markets together. Thanks to the global market, the barriers between the national markets had fallen and the international trade is much easier. The advantage of **production globalization** is in the differences among the nations

regarding the cost and quality of labor, energy, land, or capital. The sourcing of goods and services may be from all around the world, which can significantly lower the expenses or improve the quality of products or services, which leads to better competition on the market.

There is a perfect example of the globalization on a company called Vizio, which is an American company selling the flat-panel TVs. In only eight years Vizio's sales increased from zero to around \$3 billion¹ by 2012 (Hill, 2015). This company is depended on globalization, because most of the engineering and logistics and all the manufacturing is outsourced from all around the world. One flat-panel TV is manufactured in Mexico, which gets the panel from South Korea, electronics from China and the processor from United states. If there was no connection among the countries, Vizio could only get the processor without other needed components. This company is only one of many, who relies on the international trade. There are some points, on which according to Daniels (2015) many studies agreed on, as a basics of globalization:

- The level of globalization depends on the size of the country. Usually, smaller countries are on the higher level of globalization than the bigger ones. Mainly because for smaller countries the land allows the lower variety of production;
- The income affects the level of globalization. Countries with higher income have more opportunities on the market. Rich people can travel and buy more expensive foreign products, which helps the country to widen the cross-border business and international relationships;
- Differences between aspects of globalization. Even though a country might be ranked as a highly globalized in one aspect, on other aspects it may be on a low level. For example, United states are highly developed in a technology, but the economy dimension, in terms of globalization, is on the low side; (Daniels, 2015)

Globalization is a very broad and general term, which is nowadays used on a daily basis. The definitions differ from one author to another. The basic meaning of globalization however could be defined as follow: "Globalization is a term which described as an economic, cultural and populational growth of interdependency caused by transnational trade in goods, technology and services and flows of investment, people, and information. "This mean that it is not related only on the economical aspect, but also

¹ 1 billion = 1 000 000 000

on the other aspects as freedom of movement, informational flow etc. However, the degree of globalization is not the same in every country as it depends on many aspects as for example the size of a country or on the amount of income. Hence, countries should aim to force the globalization forward, so the people can benefit from it. Following subchapter defines main reasons, how globalization may influence countries. (Daniels et.al., 2015; Hill, 2015; Dicken, 2015)

1.1 Factors forcing globalization forward

In following paragraphs, there will be described more in details the reason, why the globalization increased so rapidly in last decades. Daniels (2015) lists the main reasons that countries should consider when deciding on activities leading to global cooperation with other countries and the global market.

- Extension and use of technology;
- A cross-border liberalization and movement of resources;
- Development of services to promote international trade;
- Rising consumer pressure;
- Increase in global competition;
- Changes in politics and policies of government;
- Expansion of international cooperation; (Daniels, 2015)

Extension and use of technology. In last few decades, technology development growth almost doubled in comparison with 20th century. (Rizter, 2007) More than half of the scientist of whole human history, lives now. Recent trade includes materials which decade or two ago weren't important for us or even didn't exist. Everything mentioned has the consequences in rising productivity, thanks to improved technology.

Moore's law indicates that every 18 months the price of microprocessors production falls in half, whereas the power of microprocessors double. Few years ago, this would be utopic idea, but nowadays it seems realistic. Technological innovations need's so many financial and intellectual resources, that the cooperation of companies from different countries is inevitable. (Rizter, 2007)

Technology has influenced many areas, but one of the most important was the transportation. The introduction of containerization in 1970s and 1980s lowered costs of long-distance transport significantly. The average ocean freight and port charges per ton

of United States export and import fell from \$95 to \$29 between years 1920 and 1990. (Daniels et.al., 2015) Thanks to low transport costs, flowers from Netherlands or Australia may compete with flowers from United States on their market. How important the technologies are in the business, showed us the USA in 1950 as they accounted for one fourth of global GDP thanks to their development. (Hill, 2015; Dicken, 2015)

A cross-border liberalization and movement of resources. Countries are forced to restrict the movement across the borders not only for the products and services, but also for the workers and capital to protect their industries. The trade flow interconnects countries more tightly than ever. Every country has its own limits and restrictions on the international business which can change any time, but most of the governments reduces their restrictions due to these three reasons: (Daniels et.al., 2015, Dicken, 2015)

- Greater variety with lower prices of products;
- Forcing domestic companies to become more competitive;
- Other countries will reduce the restrictions in turn; (Daniels et.al., 2015, Dicken, 2015)

Development of services to promote international trade. According to Daniels (2015) The most important service provides bank. Thanks to the bank credit agreements, it is pretty ease for companies to sell products in different countries and get paid for it, because the bank covers the convert of the currency. For example, NIKE sells their product in France to a football team, the team sends the money to French bank in euros and the bank sends the money to NIKE in U.S. dollars.

Rising consumer pressure. Costumer behavior changes, especially thanks to the internet, everyone can search for different products in different categories. Daniels (2015) mentioned that this leads the companies to a tough situation, because if they want to stay competitive, they need better products in lower prices. The investment in research and development is more important nowadays, then ever before. Firms may improve their products and services through foreign direct services (FDI). As the investments may not gain only the money but also the market advantage through acquisitions. (Dicken, 2015)

Increase in global competition. As the companies are forced to lowering prices and developing their products, thank to globalization there are new possibilities. A firm may look up for new suppliers or new markets through their competitors. (Daniels et.al., 2015) They can learn from the competitor's failures on foreign markets. Recently there is many Born-global companies, which may locate into the areas, where are the competitors and suppliers. This situation is called clustering. The advantage of clustering is, that in these areas it is more likely to find the needed resources as suitable suppliers and human talent. For domestic companies it is hard to protect their market share due to new entering companies from abroad. There are many examples of how foreign companies may get the majority market share. In United states the Japanese automobile firms have taken market share away from General Motors and Ford, the leading companies not only in United states that time. (Hill, 2015)

Changes in politics and policies of government. Comparing with the 20th century till 50's, nowadays the globalization is an indispensable part of our lives. Only between years 1950 and 2012 the volume of world trade is 31 times larger. The governments are helping to the domestic companies to became global and to bring the international trade and the investments in the country. Improving airports and seaports boost the speed of deliveries and it is also cost efficient for importing companies. Hill (2015) says that to improve the export, the governments are providing many services to the domestic firms as furnishing contacts, collecting information about foreign markets, or providing the insurance against the non-payment in domestic currency. (Daniels et.al., 2015)

Expansion of international cooperation. Companies and countries realized that it is in their own interest to cooperate with other countries via treaties, agreements, and consultations. The existence of global governance institutions was inevitable, as they shape, how the capitalist market economy works. There are three reasons, why the cooperation is bargain. **Gaining of reciprocal advantages** by joining international organizations and signing some treaties for commercial activities is essential for companies to become or remain competitive. (Malabika et al., 2016)

Solving of multinational problems of any kind (nature disasters, war threats etc.) is much easier nowadays. Countries may share the costs of any technological improvements helping to improve the wealth of residents. **Areas Outside National Territories** don't belong to any country. (Daniels et.al., 2015) Due to this fact, there is need of international

cooperation to describe the borders of fishing, to set the rules in case of the air transportation and so on. These activities are settled by various multilateral treaties, global and regional institutions and trans governmental policy networks and summits. (Dicken, 2015; Ritzer, 2007)

Many aspects are driving globalization forward from governmental policies through free movement of technology, people, goods, and services to change of global competition. These are the drivers, which helps to countries and regions enter the global market and develop relationship with other countries. Sometimes the international cooperation is inevitable as in an example of solving of international issues such as war, nature disaster etc. However, in many cases the global cooperation is advantageous for countries to improve the national prosperity as it gives more freedom to the citizens, in terms of travelling or lower costs of living, and local companies. For companies, it is beneficial to extend its activities on global scale. In following subchapter are explained the main factors driving the companies to become global.

1.2 Why companies become global

All companies face the same question at some time. The question is whether it is advantageous for them to internationalize. It doesn't have to be an internationalization of all its activities at once. For some firms the advantage may occur only from one of its activities. For example, international purchasing may lower the cost, or it can provide materials which are not reachable on domestic market. Following paragraphs are related to three main reasons, which the author sees as the most important in consideration of entering an international business as follow:

- Extension of sales;
- Resource acquisition;
- Risk reduction;

Extension of sales. In United states, approximately one third of direct export value stays behind small and mid-sized companies. All large companies do their business internationally. The motivator is simple. Companies needs sales for continuing in business and improving in their area. In their domestic country, no matter which country it is, is not enough potential customers as in whole world. (2015; Dicken) This means, that through the international trade, companies may get higher sales thanks to larger market.

Moreover, thanks to higher sales, firms are often able to lower their production cost by covering the fixed costs over a larger number of products. Thanks to lower unit costs, the sales are even higher. However, the countries differ one from another, so companies should consider, which markets are suitable for their portfolio and how accessible this market is. (Daniels et.al., 2015; Dicken, 2015; Ritzer, 2007)

Resource acquisition. It is usual nowadays to look for products, services, resources, and components in foreign countries. The main drivers are inadequate domestic supplies, seeking for cost cuts, improving product quality, or differentiating products from others. According to Daniels et.al. (2015) the main recent drivers for becoming global in terms of assets are the knowledge and the labor, as the knowledge improves the quality of the product, and the labor lowers the cost. This leads to potential increase of market share and profits.

Cooperation or acquisitions abroad might help also on the domestic market by using the knowledge from other markets or by hiring the employees from other countries bringing new perspective in teams. Boeing takes advantage by outsourcing in different countries especially in quality and cost cuts. Their Boeing 787 is outsourced by 65% of the total value. (Hill, 2015; Dicken, 2015)

Risk reduction. The diversification among countries from all the world, with different business cycle may help companies to reduce the swing in sales and profit. In countries with the recession type of business cycle, companies often experience a slow growth or even decrease in sales. On the other hand, countries which are expanding economically, may offer to firms a fast sales growth. The risk reduction implies also on the supplies of material or products. Having suppliers in a domestic country and abroad may help to reduce the price swings and the material shortages. Another risk reduction may come from the quality and labor. Countries differs in terms of productive and skilled labor, so for some industries may be important to move the production in country with highly skilled and educated workers. (Daniels et.al., 2015; Dicken, 2015)

All these benefits play a significant role in deciding whether it is beneficial for company to extend its activities abroad or to stay on current market. Mostly for large companies it is advantageous to move its activities abroad. On the contrary, SME's have harder decision making if it worth to join the global market or not and mostly it depends on its specific

situation. If a company decides for internationalization, then it doesn't have to be only in term of foreign sales but also in other aspects, as described in following subchapter.

1.3 Internationalization

Internationalization is defined by Daniels et.al. (2015) as all commercial transactions between two or more countries. Among these transactions are sales, investments and transportation. According to Joshi (2009) internationalization is simply a conduct of business activities beyond the state borders. He also adds that all commercial transactions may take place by private companies or even governments with or without an objective of profit making. These transactions involve the international trade and investments. International trade refers to an export and import of goods and services when buyer and seller are in different countries. International investments imply to transferring the resources needed for business activities. These might be even the short-term portfolio investments or the long-term capital investments. (Krugman, 2015)

Daniels et.al. (2015) evolved the **basic patterns of expansion**, which should help companies to move into international markets. As illustrated in Figure 1., the expanding circles depict shows different levels of internationalization. The different axes depict various modes, motivation, and implementation forms of internationalization strategy. As the strategies and resources of each company differs, the speed of which the firm moves, is not the same along each axis. It is also important to mention, that the farther the company moves on any of the axes, the deeper the international commitment become. (Bryson et.al., 2020; Lima, 2008)

The axis A shows that companies tend to gradually moves from the domestic market into the very similar market to the home market in case of the operations. (Daniels et.al., 2015) Afterwards, the firm gets to another level of markets, which are completely different to the home one. There is an alternative in case of moving very quickly on the A axis, to move slowly on the B axis. (Lima 2008) This axis includes the use of intermediaries, which helps firms to convey the international activities during the first stages of international expansion. The main driver is to minimize the resources it puts and the foreign liability.

Intermediaries are well acquainted with the foreign market so the company may then allocate fewer resources to international efforts. However, when the business growth successfully and have future growing potential, then for firm it may be economically

and operationally better to handle the international operations on its own. This occurs, when the company is doing business on international level for some time, so the international operations seem less risky and so they decide to invest more in hiring trained people for the foreign sales and purchases departments. (Bryson et.al., 2020; Daniels et.al., 2015; Lima 2008)

When a company is at the early stage of internationalization process, it does only the import and exports activities on a low level. It means, that it requires placement of only a few company resources abroad. As moving forward on the axis C, firm develops its foreign activities in the way of joint ventures, foreign direct investments, or licensing operations. The last axis D is related to the number of countries in which the company does the business. In this case, companies should expand into foreign countries one by one, so they can avoid of being overwhelmed. Of course, in some cases there might be competitive driver, which forces to simultaneous moving to foreign countries. (Daniels et.al., 2015; Lima 2008)

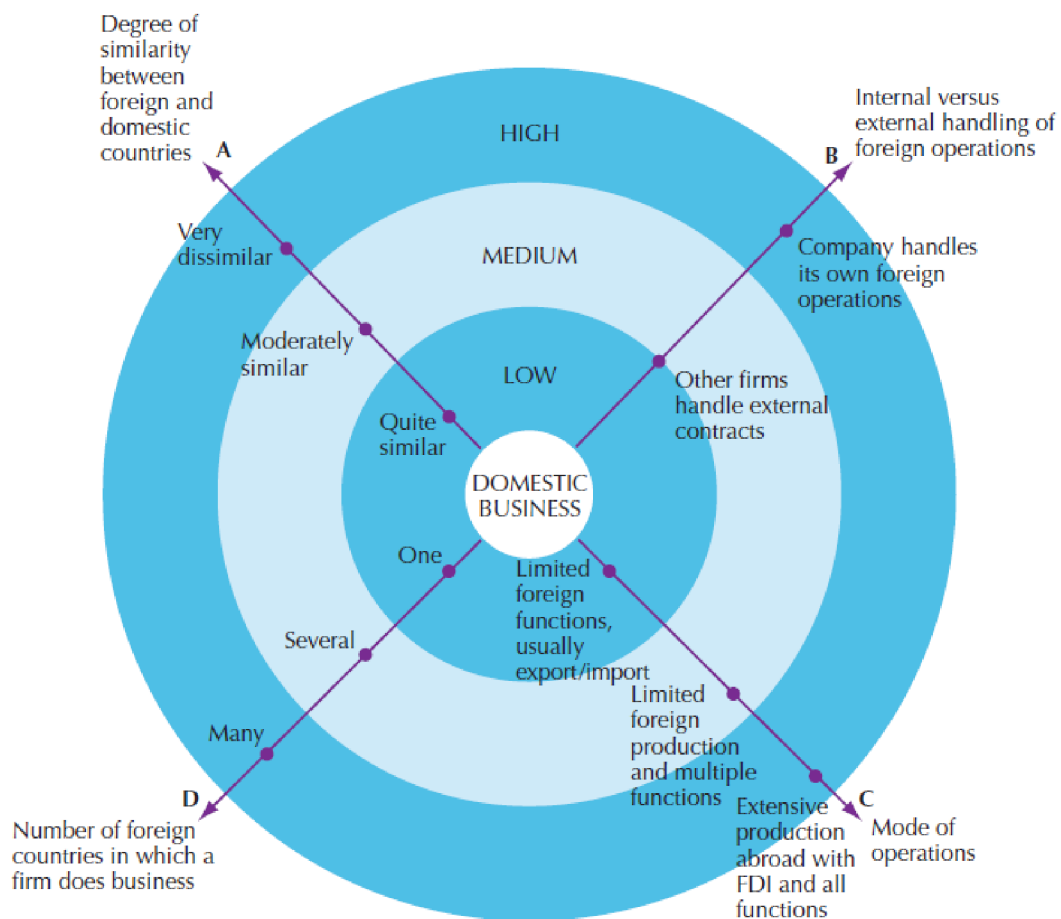


Figure 1 Patterns of expansion

Source: Daniel et.al. (2015)

During the internationalization process company moves forward on one or more patterns gradually. It should be remembered that every company is different and therefore the movement on the axes is different. The speed of movement on each axis may differ as companies focuses on individual patterns. Fully internationalized company reach the highest level of each pattern as in case of Knorr-Bremse. There, the largest circle on the edge of the figure is reached and there is no possibility to go further. This company do the business in many countries, which are mostly completely different from each other, it handles its own foreign activities, and the production is divided in many countries and regions across the world also in its acquired companies. (Daniels et.al., 2015; Lima 2008)

1.3.1 Internationalization models

As there were and still are many companies doing business only on a domestic level, many authors created various models describing the stages of international process. These models should help companies to minimize the risks of expansion. The main goal of models is to explain the characteristics of the process of internationalization. Every model has its own defining characteristics, that are that translated into specific implications for the firm, both at the level of operations management, resource deployment and even risk propagation. The main models include the Uppsala model (1977), Stopford and Wells (1972) model and the born globals. However, in following paragraphs, the focus is on the Uppsala and Stopford models. (Danciu, 2012; Roque and Co., 2019)

Uppsala model (1977)

Comes from the Swedish business school of the same name and it relies on the knowledge and learning. This model was developed to explain chronological steps of increased foreign dedication. It is based on empirical observation of four Swedish manufacturers: Sandvik, Volvo, Atlas Copco and Facit. It emphasizes the progressive character of international expansion. The knowledge is the main driver of the internationalization, so the lack of the knowledge is an important obstacle of the international operation development. By learning from doing an international business the company achieves some knowledge, which is important for overtaking these obstacles.

It also suggests, companies with significant resources may overlap some stages or even internationalize in one step. The “born global” companies are perfect example of overlapping the stages without necessary knowledge and learning. The best way of starting the internationalization process is to focus on markets which have less physic distance. The physic distance may be defined as the perceived differences between individuals among the home and the foreign country. Thus, the company may skip some stages as it already has the knowledge about the foreign country by using the knowledge from the domestic market. (Danciu, 2012; Abdullah & Zain, 2011; Zohari, 2021)

According to Górska (2013) there are two patterns, on which can the Uppsala model provide an explanation in terms of internationalization. First pattern is related to company’s engagement in specific country proceeded along with the establishment chain via following stages:

- Sporadic export;
- Export via independent representatives;
- Sales subsidiary;
- Production and manufacturing; (Danciu, 2012; Górska, 2013)

The order of the stages shows not only the increasing commitment of resources to the market, but it also indicates current business activities, which are changing through the process of experience gaining. In the first stage is none, or only a low foreign activity so there is also no market experience. In the second stage is a market information channel, via which the company receives an information about the market conditions on regular bases. In two remaining stages a company performs in the market and thanks to it, they gain a more differentiated and wide market experience and knowledge. (Kuivalainen et.al., 2012; Górska, 2013)

The knowledge is divided in two groups by Danciu (2012). Firstly, market-specific knowledge is expected to be obtained primarily on the basis of market experience. This type of knowledge cannot be achieved without specific activity in specific market, so it is also difficult to use this knowledge in other markets. Secondly, general knowledge, which may be easily obtained and transferred from one country to another. (Górska, 2013; Zohari, 2021)

The second pattern is about the psychic distance. Companies enter new markets, which are in successively greater distance. According to Górska (2015) psychic distance is explained as factors, that are preventing or disturbing the information flows between company and market. Among these factors might be language, level of education, culture or even political system. Naturally, there should be a natural correlation between the psychic distance and the geographical distance, but often there are exceptions.

For example, there is much higher physic distance between Japan and North Korea in comparison with UK and Australia, even though there is a huge difference in term of the geographical distance. This is because there is a completely different political system in the case of Japan and North Korea and a shared history in the case of the UK and Australia. Danciu (2012) adds the third pattern, which shows how a company's knowledge influences its investment behavior. More knowledge that a company has reduces the risks to the company.

In the Uppsala study is a reference on the interdependency of market knowledge and market commitment, made by Aharoni (1966). They developed a matrix model, which illustrates the positive correlation between market knowledge and commitment decision and also it highlights the gradual development of market activities and its positive correlation with market commitment. The model shows that increased market knowledge increases the market commitment and vice versa. (Zohari, 2021)

Stopford and Wells model (1972)

As there are many organizational structures, companies should choose the most appropriate one for their business type, product portfolio and degree of internationalization. This task is often really difficult, so Stopford and Wells decided to do a survey of 187 companies and subsequently created a model, which describes the usual types of organizational structures in certain degree of internationalization. This strategy-structure model for multinational company structures uses two international strategies. **Foreign product diversification** which describes the extent to which companies diversifies its products on the international l markets. **Area diversification** is related to the level of expand the business to foreign markets. (Qui and Donaldson, 2012)

The model itself consists of two axes as on the Figure 2. **Foreign product diversity** represents the foreign product diversification strategy. It contains the number of product lines, which are sold in foreign markets. **Foreign sales** representing the are diversification. This includes the share of foreign sales in total sales. Stopford and Wells suggest that when these two strategies are used simultaneously, a certain structural-strategic pattern emerges. When there is a company, which has low foreign product diversification and low foreign sales, it usually uses the international division structure. (Birkinshaw and Terjesen, 2003)

This company has low international experiences and so there is only one division, which focuses on whole international market with low level of foreign strategies. If the company has a high foreign product diversification and low share of foreign sales, it most often uses the worldwide product division. Here, the company focuses on its products and the local responsiveness is rather low. The meaning is that firm has a division on each product on the 2nd hierarchy level of the organizational structure. (Birkinshaw and Terjesen, 2003; Qui and Donaldson, 2012)

The advantage is, that the communicational channels for any product portfolio is the shortest possible. The worldwide geographical division structure is the most suitable for companies with low level of the product diversification and high foreign sales. It provides strong control and coordination within the areas. These three propositions were empirically supported. The level of high product diversification and high foreign sales wasn't statistically approved to have one common organizational structure. However, authors of the model predict, that the matrix is the most suitable, because its dual structural dimension is established to facilitate both product and area diversifications. (Qui and Donaldson, 2012; Egelhoff, 1988)



Figure 2 Stopford and Wells model (1972)

Source: Qui and Donaldson (2012)

However, Engelhoff (1988) found in his research that there is a difference in the product division structure and region division structure in terms of the diversity of foreign products, but he does not find significant differences in the case of foreign sales. In his study were involved mainly European multinational companies, on the contrary Stopford and Wells included mainly US based firms. The difference is in terms of the product division structure, where there was a high percentage of companies with high foreign sales in the case of European firms.

The reason is that European companies are forced to have high foreign sales if they want to become successful competitive companies, because European countries are small compared to the US. However, this does not explain, why companies operate with product division structure and not with the matrixing the area division with product division structure, as Stopford and Wells would predict. The reason is again related to the area difference of European and US companies. The percentage of foreign manufacturing was not significantly necessary in case of US firms, but it is needed in case of smaller states as of the European countries. (Birkinshaw and Terjesen, 2003)

Second limitation of Stopford and Wells model is, according to Engelhoff (1988), lack of product division x area division matrix structures observed in presented study. On the graph Of Stopford and Wells is a lack of usual company structure in the top right corner, where the high foreign sales and high product diversification are met. Egelhoff,

adding the third condition of the percentage of foreign manufacturing, explains that the product division x area division matrix suites the most on this place.

After evaluating these data, Egelhoff (1988) divides the previous graph into two parts, as shown in the Figure 3. First part includes the companies with low percentage of foreign sales and the second part includes the firms with high percentage of foreign sales. The bottom axes have changed on the percentage of foreign manufacturers. Everything else basically remains the same except for the addition of the specified company structure in case of firms with high percentage of product differentiation, high percentage of foreign manufacturers and high percentage of foreign sales.

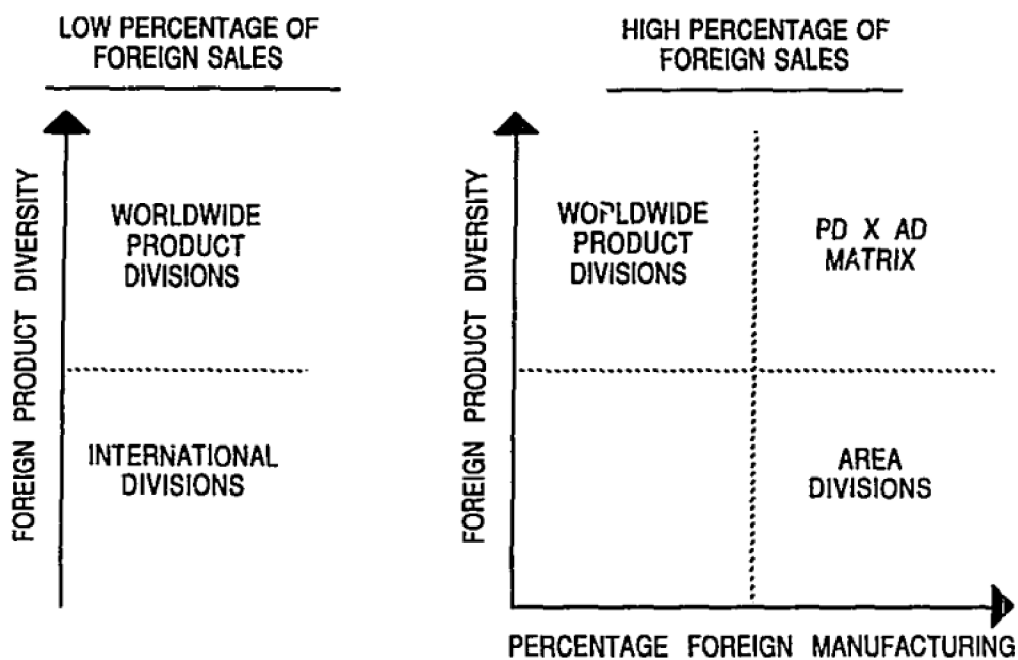


Figure 2. Revised model showing the relationship between strategy and structure in multinational corporations

Figure 3 Egelhoff model (1988)

Source: Egelhoff (1988)

Both models might be used on chosen company Knorr-Bremse (KB). In case of the Uppsala model KB started its international activities on its region in a similar country to its home country. The main European countries in term of production capability are except the home country, Hungary and also Czech Republic. As KB was growing, it also has expanded to other regions such as Asia and North America through the acquisitions and joint ventures. In case of Stopford and Wells KB with its diversified foreign products and high percentage of foreign manufacturing is located in a model in the top right corner.

The recommended organizational structure is a matrix, which fits to the purchasing department.

Summary of the chapter

In this chapter two main terms were described in detail. First term is a globalization, for which some definitions were mentioned from recent studies of Daniels et.al. (2015) and others. The summary of these definitions is described by the author. Globalization is a term which is described as an economic, cultural and populational growth of interdependency caused by transnational trade in goods, technology and services and flows of investment, people, and information. This sentence captures the general definition of globalization.

There are factors, that are driving globalization forward. These aspects include governmental policies which allows free movement of technology, people, goods, and services necessary for changing the global competition. The global cooperation is advantageous for countries to improve the national prosperity by reaching competitiveness of home market, which is advantageous for both the citizens and local companies.

For firms, if they have the possibility to expand to other countries and regions, it is necessary to decide whether it is convenient to do so or not. Three main drivers for becoming global are extension of sales, resource acquisition and risk reduction. Extension of sales increases the revenues of company. Resource acquisition should lower the purchasing costs which helps to improve the competitiveness and increase the revenues. Risk reduction ensures the reduction of possible situation and its impact (political, economic) in specific area by diversification.

Internationalization stems from globalization as an aspect focusing on business. Includes all business activities and transactions of a company between two or more countries. There are patterns from Daniels et.al. (2015) which are describing the way of becoming international company. Four different patterns are focusing on the similarity between home and entered countries, level of handling foreign operations, number of foreign countries in which the company do business and the level of foreign operations. Each aspect is independent and the speed of moving on every aspect may differ.

Lastly the main internationalization models are described. The Uppsala model (1977), which focuses on the knowledge of foreign countries is the first one. It explains the way, how companies may successfully become global. The main driver is the knowledge of foreign market which can firm gain by hiring an experienced external company or via slow expenditure through similar countries to the completely different ones.

It explains that increased market knowledge increases the market commitment and vice versa. Second model from Stopford and Wells (1972) is focusing on the organizational structure of a company, depending on the level of internationalization. Two main drivers affecting the organizational structure are the level of foreign sales and level of foreign product diversity. By moving on these axes, a company should be changing the organizational structure to ensure a proper operation of a company.

From all the activities involved in globalization and internationalization, international purchasing is the one, on which this master thesis focuses. It is one of the activities, for which the global trade opens up a great potential for improvements of its services. On the other hand, there are also risks involved. As distance increases, the potential for lower prices and higher quality increases, but so does the risk of transport. All these aspects are described in following chapter.

2 International purchasing

In this chapter focuses on the theoretical background of the purchasing process of a company. Firstly, the term supply chain is described as it is a superior element of purchasing department and its processes and activities. Afterwards, purchasing is defined together with the purchasing department itself as it is one of the most important divisions in a firm. Furthermore, the main purchasing activities are listed and subsequently explained in detail. Last point of this chapter is dedicated to the international activities of purchasing department, as the internationalization of this process is a core point for company's competitiveness.

As the purchasing is a part of **supply chain management**, firstly this term will be described. For Supply chain management there is no explicit definition, many different approaches can be found from many authors across the literature. The basic and very wide definition of supply chain management was written by New and Payne (1995). The definition says that it is a chain connecting each manufacturing element and supply process from the raw material right to the end user. Thus, the supply chain management encompasses the whole value chain and addresses material and supply management from the extraction till the end of product lifetime. Baatz (1995) adds that it also includes the re-use or recycling activities. However, literature from recent century as Daniels et.al. 2015) includes also other activities involved in process and is also more concrete in describing these activities.

Supply chain management involves the planning process and the management of all activities involved in sourcing, procurement and all logistic actions associated with company activities. It is not involved only in intercompany activities, but it also includes the collaboration and coordination with suppliers, customers, or third-party service providers. Essentially, supply chain management connects supply and demand management inside and outside the company. Additionally, there is an important difference between two terms: supply chain management and operations management. These terms shouldn't be interchanged. The supply chain management refers to outside activities of the value chain, whereas the operation management is related to internal activities. (Tan, 2001)

Purchasing

During the early 1970s the purchasing department was viewed as a passive role of business organization, with only an administrative function. It all changed during the oil crisis between years 1973 and 1974. The raw material shortages drew the attention significantly towards the purchasing activities. Even though there was a first hint towards the importance of purchasing, the role of this department still wasn't integrated into the corporate strategy. In 1980s Porter identified, in his seminar work, buyers and suppliers as a critical force in a competitive nature of industry. (Ellram and Carr, 1994; Easton and Co., 2002)

Since then, suppliers and firms in role of buyers were receiving recognition in the literature. Purchasing started to be a significant potential to reduce costs as in many manufacturing industries the purchased components constituted over 55% of the sales. As the technology has advanced in last 30 years, the labor and operating costs were reduced, which in turn increased the percentage of purchased cost in sales. The global market increased market competitiveness, which forced companies to reduce costs. All this allowed management to realize the importance of purchasing in corporate strategy. (Ellram and Carr, 1994; Easton and Co., 2002)

Purchasing is defined by Cox (1996) as a tool analyzing the external market, developing relationship with suppliers, and negotiating contracts to increase the profitability of the firm and supply management by lowering the purchasing costs. Purchasing may be defined also in terms of the supply chain management. In this case purchasing department serves as a strategic tool for reduction of redundancies and increase of efficiencies through communication with suppliers. However, the clearest definition was stated in book written by Quayle (2006). Purchasing is considered as a process by which a company contracts with supplier to get the good or services required for fulfilling the business objectives as quickly and efficiently as possible.

Purchasing department

The need for a purchasing department is very high in the case of large corporations as well as small businesses because it sets policies and procedures to ensure the financial health of the business. Often, purchasing is a separate division, which is responsible for securing of parts and services the business needs for operation. Many firms use different

names for this division as procurement department or buying department. Whatever the name is, every unit is an important part of a company for meeting their daily needs and achieving long-term goals. The size of this department differs in each firm, but often they help with monitoring the supply chain and negotiating the vendor contracts, so the company's operations stay efficient. (Indeed Editors, 2021; Asalekar, 2021)

Asalekar (2021) differs two main types of purchasing departments. **Strategic purchasing** has a planning role in procurement activities based on the business goals. It decides internally if the in-house manufacturing or the external purchasing is optimal. However, **tactical purchasing** is responsible for business operation and administration. The order repetition, inventory restocking, or invoice payments are the main function of this department, which are needed to maintain the production line running at the optimal capacity. However, these two types of purchasing may connect to each other, so the activities from one type can occur in the second type of purchasing. It happens very often that specific activities are formulated according to the needs of company and its organizational structure. (Indeed Editors, 2021)

The main functions of the purchasing department include a close relationship with suppliers that can improve the overall quality of a company's product or service. Firm may also lower the risk of company operation by managing a good relationship. Purchasing department helps to achieve lower purchasing costs, which leads to raised profit, lower expenditures, and company's growth. On the operational level, this division oversees the raw material as iron or plastics, supplies for employees or technology deliveries. If these deliveries are efficient, it ensures high production with delivering goods to customers on time. (Indeed Editors, 2021; Asalekar, 2021)

2.1 Purchasing activities

As the purchasing department has a high level of responsibility, there are many purchasing activities needed to fulfill the targets from high management. The number of activities together with the level of responsibilities differ at every company. In small companies are often only few employees working in the purchasing department, however in large companies especially in automotive industry, the need of many experienced buyers is high. Common purchasing activities in large entities are described in following chapter. (Yang and Co., 2012; Carter et al., 2000)

- **Strategic sourcing** is very important for selecting the right suppliers, with whom it is advantageous to develop a long-term relationship. Both sides consequently implement a continuous system feedback, which improves the overall service. In this activity is also included the decision making, whether the insourcing or outsourcing is more suitable for specific project; (Yang and Co., 2012; Carter et al., 2000)
- **Reverse auction** helps firms lower the purchasing price and even improve the quality of the product or service required. It allows buyers to get quotation from more than one supplier. Web-based electronic reverse auction enables the cooperation among the supply chain partners across the world, so buyers can obtain offers from low-cost countries; (Yang and Co., 2012; Carter et al., 2000)
- **Supplier conferences** improves the relationship among the parties. When buyers and sellers meet, they can communicate specific projects or even issues such as supplier expectations or possible long-term contracts. Several studies as from Chen et al. (2004) or Carter et al. (2000) found out, that supplier conferences are critical for enhancing supplier-buyer collaboration and manufacturing performance; (Yang and Co., 2012)
- **Supply base rationalization**'s main foundation is the determining of appropriate number of suppliers in their portfolio. The existing literature shows that rationalization of the supplier base necessitates efficient supplier selection, volume consolidation and bundling of parts, which in turn contributes to cost reduction and quality improvement; (Yang and Co., 2012; Das and Narasimhan, 2000)

Automotive industry is a very specific type comparing to the other types, as the need of many different parts is required to assemble whole car, truck etc. In general, an automotive is composed of approximately 15 thousand parts in total, which confirms the importance of purchasing activities (Wei & Chen, 2008). Furthermore, comparing to other industries, in automotive is the emphasis placed on quality, which in general affects the supplier decision making. All activities mentioned above are crucial in automotive industry as all of them are focusing on the quality and purchasing price reduction.

Strategic sourcing and supply base rationalization are aiming on the suppliers and the relationship with them. These activities are important as the reasonable number of reliable suppliers helps to keep the standard quality with limited delivery issues. The reverse auction focuses on lowering the purchasing price which is necessary for being competitive as in average material costs amounted to 47% of total costs in car production (Statista, 2015). Lastly supplier conferences help to improve both the quality a product thanks to possible discussion with R&D and the price reduction as the company may discuss a long-term contract. (Yang and Co., 2012)

2.2 International purchasing

As the purchasing refers to activities related to the acquisition of goods, raw materials or services that firms need to achieve their business objectives, international purchasing expands these activities on the international markets with a goal of ensuring a reliable source of supply and to support the firm's operation. It has become a great deal during 1880s and 1990s, when US companies were challenged by firms from foreign markets. As the US companies were becoming less competitive comparing to the competitors, the implementation of international purchasing could help them to reverse this decline.

Most of the researchers (Kotabe, 1994; Handfield, 1994 etc.) were focusing on the benefits, that could occur to the US firms while through sourcing offshore. The primary benefit of international purchasing at that time was to reduce the unit price of a product. There are two views maintained. First view says that technological and organizational advances increase the speed of transportation and communication while reducing the costs. However, the second view claims, that the distance remain a significant barrier and the true international purchasing costs are unknown or hidden. (Trent and Monczka, 1998; Trent and Monczka, 2003; Moreira et.al., 2018)

Among the benefits of international purchasing belongs a possibly higher quality a product or service, greater access to developed product and technology, achieving sufficient capacity or the ability to introduce the competition on a domestic supply base. On the other hand, due to the international purchasing, occurring of new risks is inevitable. Such risks include additional inventory across extended material pipelines, longer lead time of the samples and serial production, dealing with new and unknown suppliers, total costs higher than a unit costs, different business behavior, or managing different language, currency. (Murphy and Daley, 1994; Trent and Monczka, 2003)

Carrete (2008) defines the main aim of the international purchasing. The purpose is not only the cost reduction, but also the quality improvement of the product or receiving benefits of the technological developments related to the products and processes. It is not an activity only for a large industrial customer. Nowadays, small, and medium enterprises from different sectors of industrial activities are involved too. The share of international purchasing grows every year as the companies must face to ever-growing competition.

2.2.1 International purchasing risks

With the increasing number of international purchasing activities between companies, some issues have emerged that affect the proper functioning of these activities. Among them are the hidden purchasing costs and logistical, governmental, cultural problems etc. These issues may further affect the decision making of companies, whether to focus on international purchasing or to prioritize local suppliers. In following paragraphs are explained and specified all these issues as follows: (Carrete, 2008; Ağaoğlu, 2020; Davis, 202; Page-Lecuyer, 1991; Levy, 1995; Min and Galle, 1991; Hofstede 1980)

- International purchasing costs;
- Logistic issues;
- The cultural problem;
- Governmental issues;

International purchasing costs.

In literature on international costs, are defined the added costs, which are not included in the national purchase costs. These include the transportation costs, import taxes, financial expenses, fluctuation on exchange rates, trips to the supplier plants etc. However, the main costs on which the literature focuses the most are related to international transport, the fluctuations in exchange rates and the intermediaries involved in international transactions, according to Carrete (2008). The transportation costs may raise the product price by approximately 5 to 30 percent. (Carrete, 2008) Thus, the logistic costs may influence the overall competitiveness of the product price as a hidden cost. The range is so wide as the products differs in way of the weight and the size. Incoterms are perfect example of hidden costs.

Incoterms² define supply chain requirements for the sale and purchase of goods. It is a worldwide accepted term. It is a recognized way of expressing in a concise and enforceable way the obligations, risks, and costs that each of the sellers and buyers must undertake when exchanging goods. It is not only used internationally, but also for the domestic market. The Incoterms rules contain abbreviations for three-letter terms, which have precise meanings in relation to the sale of goods worldwide. The most used Incoterms in KB CVS are Free Carrier (FCA) and Delivery at Place (DAP). FCA are mainly required from the European suppliers. DAP is often required from overseas suppliers, such as Chinese or Indian. (Ağaoğlu, 2020; Davis, 2021; Grath, 2016)

The exchange rate fluctuation is important in case of the buying company must pay to the supplier in different currency. The currency rate must be considered in the decision making together with the timing of the decision making. In this case, buying foreign currency in advance may lower possible impact of exchange rate. When it comes to the cost of intermediaries involved in international transactions, the most popular functions buyers are willing to pay for are freight charges, tracking and expediting shipments, routing recommendations, issuing export declarations, and preparing certificates of origin. (Page-Lecuyer, 1991; Levy, 1995, Krugman, 2015)

Logistic issues

Were identified as the most important obstacle in international purchasing by Carrete, (2008). It does not matter, whether it happens in America or Europe, every time the consequences are the same. Company has to pay for faster transportation, finds another supplier who is able to deliver needed products on time or in the worst case, the production may stop. The authors also states that the lead time is the main difficulty for buyers as the international purchasing is incompatible with just-on-time process. Lead time can influence the decision whether the stock administration is necessary or which type of transportation choose. The most used type is the sea transport, but also the air transport may be considered in choosing the transportation type. The results of study from Levy (1995) shows, that companies with integrated logistic system should be more competitive than those with uncoordinated manner. (Grath, 2016)

² All Incoterms are shown on Figure 10 in subchapter „4.2.3 The evaluation process “

The cultural issue

Comparing to the delivery problems, cultural heterogeneity has shown less issues as the study from Min and Galle (1991) shows. As the most serious obstacles buyers see the linguistic and cultural differences during a negotiation phase. The size of a team, different behavior during a conflict or dishonesty of international supplier, are some examples of the obstacles during the negotiation phase. The recommendation for dealing with these situations or how to avoid these situations is the adaptation of the content and the style of communication to the counterpart. The social differences between countries are defined by Hofstede (1980). He analyzed thousands of people in 76 countries and as a result the model of national culture became. In this model are six dimensions, representing independent preferences for one state over another that distinguish countries from one another.

First dimension represents the **Power Distance index**. It should the level, by which less powerful members expect and accept an unequal distribution of power. People in countries with large degree of Power Distance accept the order in hierarchies. Everybody has its place and there is no further need of justification. In low Power Distance societies is the aim of equal distribution of power. People are equal. **Individualism versus Collectivism** is the second dimension. Individuals take care only of themselves and their closest family. However, collectivism represents a wide member relationship, where everyone takes care of the other and vice versa. The difference is seen in terms of “I” and “We”. (Hofstede, 1980)

Other dimension focus on the difference between **Masculinity and Femininity**. Masculinity defines society with preference of achievements, material rewards and assertive behavior. They are all competitive. Femininity relies on modesty, cooperation or caring for weaker. **Uncertainty avoidance index** shows the degree, which express how society feels uncomfortable with uncertainty. In countries with high degree of this index, people need to have certainty for future. Low degree represents people with relaxed attitude. (Hofstede, 1980)

Long term versus short term orientation. Societies with low degree of this dimension prefer to maintain established traditions and norms, while they look on social changes with suspicion. In contrast, companies with high score take a more pragmatic approach. They encourage conservation and the drive for modern education as a way of preparing for the future. Last dimension focuses on the difference between the Indulgence and Restraint.

Indulgence people enjoy life and have fun without any regulations and gratification of needs. Restrain society is governed by strict social norms. (Hofstede, 2022)

Governmental issues

Foreign trade controls are mainly discussed in the international trade literature (Min and Galle, 1991; Carrete, 2008) from a legal perspective in order to explain their impact on buyer's purchasing operations. Import control studies focus primarily on making buyers aware of the implications of international transactions according to the nature of the product, its origin and destination. Two main approaches this issue managing is defined by Carrete (2008). First approach analyzes actions of qualitative aspects. These includes the requirement for the supplier to meet health, safety, packaging, and labelling standards so that products can be legally imported into the country. The second approach analyzes actions of quantitative aspects. buyers have to comply with the quota restrictions under the imported product to ensure its availability.

Chapter summary

Supply chain management includes all the activities needed for the chain connection between the raw material retrieving to the end user including the supply process and manufacturing element. Some authors as Baatz (1995) or Daniels et.al. (2015) includes in this definition also the re-usage or recycling process, and specific activities as planning and managing of sourcing, procurement, and logistic activities.

Purchasing has evolved from a role of a passive part in a business organization with only a function of administration in early 1970s, to a necessary part of a corporate strategy in 21 centuries. Purchasing is a tool, through which a company analyzes the external market, develops relationships with suppliers or lowers the purchasing costs by negotiating. It ensures, that a company get the good or services, which are needed for business objective fulfillment.

Purchasing department is often a separate division in large corporations. The size of department differs and is not defined. There are two types of purchasing department. First is a strategic purchasing, which has a planning role based on the business goals. It's responsibilities help with sourcing the goods at economical prices with optimal quality. Whereas tactical purchasing is responsible for business operation and administration.

As the companies and its business goals differs, purchasing departments and its responsibilities may differ too.

Purchasing activities differs at every company. However, there are some, which may or should occur in most of the purchasing departments. Among them belong the strategic sourcing, which ensures the suitable supplier selection. Reverse auction helps to find the market price of product, which lower the purchasing costs. Supplier conferences may improve the relationship with the suppliers and finally the supply base rationalization determines the appropriate number of employees in its portfolio.

International purchasing aims to expand the purchasing activities on an international level. The benefits of expenditure of purchasing activities abroad are the improvement of purchased product quality, greater access to developed technology or gaining a sufficient capacity of production. However, still there are potential risks for doing business on the international level. Carrete (2008) specified four main risks, on which a company should focus on, to lower the impact as much as possible. Hidden purchasing costs, governmental and culture risks are included. However, the biggest problem occurs during the logistic activities. The lead time is the most important aspect in case of the just-in-time process of production. The transportation disruption may cause a lot of damage in worst case by stopping the production. Companies must decide whether the safety via the stocks in warehouse is needed or not.

3 Introduction of a company

Third chapter focuses on the description of Knorr-Bremse. It starts with brief history followed by current financial data, showing an important position on a market. The locations of Knorr-Bremse CVS are important for understanding the internationalization of this company. Three regions are the main drivers of a company, Europe, Asian Pacific and North America. Subsequently the focus is on the location placed in Liberec, Czech Republic. The product portfolio of Liberec manufacturing plant is described to better understand the position of chosen plant in Knorr-Bremse CVS. For the chosen location, also the placement of the buildings is shown, together with its organizational structure description.

Knorr-Bremse AG (KB) is an international corporation, doing business in more than 30 countries at more than 100 locations all over the world. The business form AG is a German term for a public limited company. This is a type of business form, where the shares of a company are offered to the public and traded on a public stock exchange. The advantage for the owners is that they are liable limitedly to their investment. For more than 115 years, KB is a leading company in two business areas of braking and other systems, in rail and commercial vehicles. Both divisions together earned more than EUR 6 billion in 2020. As these business areas are different, so the company divided them into two roughly the same sized divisions: KB Rail vehicle systems and KB Commercial Vehicle Systems. With its approximately 30 thousand employees, KB has a capable workforce for future business. (Knorr-Bremse, 2022; Annual Report, 2020)

3.1 Global distribution of Knorr-Bremse

This thesis focuses mainly on the Knorr-Bremse Commercial Vehicle Systems (KB CVS) division. The reason is, that chosen location of KB is in Liberec in Czech Republic as it is part of commercial vehicle division. The KB CVS with its almost 13 thousand employees all over the world is an important part of KB AG. The locations of KB CVS are widespread all over the world on every continent, with its production facilities and other types of offices as seen on Figure 4. KB is divided on four main regions: Europe, Asian Pacific, Brazil and North America. Every region has its every year targets to achieve. Further, the main manufacturing locations, also including a place for technical and economic staff, are described. (A Knorr-Bremse, 2022)

In Asia Pacific, eleven mostly manufacturing locations in total are placed. The reason behind is to take the advantage from low manufacturing costs in so-called low-cost countries. Especially China and India are considered as the cheapest manufacturing countries according to the survey made by Radu (2019). Six locations are suited in China on the east coast in Hong Kong, Shanghai and mainly near to the city Dalian. In Dalian is a KB's joint venture company Hasse & Wrede, originally from Germany, focusing on Visco-Dampers and Hydraulic Dampers products. The other locations are separate autonomous entities. In Japan near to the capital city Tokyo are suited another two locations of Knorr-Bremse Commercial Vehicle Systems Japan Ltd. Last three plants are located in South Korea (one) and India (two). All are also separate autonomous entities. (A Knorr-Bremse, 2022)

Similar locations may be found also in the North America. In the United States of America can be found nine locations. In most cases the locations are a part of Bendix Commercial Vehicle Systems LLC. Bendix is one of acquired companies by KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH. It is the company that first introduced landmark air brake system technologies such as air compressors, air dryers, and ABS to the North American commercial vehicle market. (Bendix, 2022) However, the largest representation is still in the Europe. The oldest and the main manufacturing plant is in Aldersbach in South Germany, where the biggest portion of production is held. The second biggest manufacturing plant is located in Hungary, Kecskemét. Other production sides are in France in Lisieux, Great Britain, where another acquired company called GT Group is placed. The most important location for this thesis is the one in Liberec in Czech Republic, as there is a focus on this plant. (A Knorr-Bremse,2022)

All the plants are separate entities with its own legal form. The only plant directly belonging to KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH is located in Aldersbach, Germany. All other entities are fully owned by KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH, which is the CVS division of parent's company Knorr-Bremse AG. The legal form of Liberec entity is s.r.o. and the Managing Director is Mr. Košíček. Knorr-Bremse Systémy pro užitková vozidla, ČR, s.r.o. (KB Liberec) is fully liable for breach of its obligations with all its assets. (B Knorr-Bremse, 2022)



Figure 4 Map with all locations of KB CVS

Source: Knorr-Bremse CVS (2022)

Liberec plant consists of three main buildings located in the industrial zone Liberec Sever (Figure 5). The main and the biggest building is named as H5. The serial production is located there with all the technical and economical workers. These employees are represented by logisticians, accountants, technicians, human resources, quality, sales and purchasing workers and the top management of this location.

The building next to the main one is called H7 or also as “Reman”. Reman is a shortcut of word remanufacturing, which is also the main goal of this building. The job description includes buying of old parts from services and salvage yards, checking if they are usable or totally damaged and lastly remanufacturing them if possible and sell them for further usage. The last hall was built in 2017 so it is the youngest building of KB Liberec. There are located the laboratories of quality department, but the main function is the warehouse usage.

In Liberec center is located one more branch office of KB CVS. However, this does not fall under the Commercial Vehicle Systems division, but under KB AG, which is the parent company. It is a Business Service type of subsidiary, which means, that their workload is to provide services as accounting IT support etc. to all other locations and plants of both KB divisions. However, as this entity doesn't belong to the Commercial Vehicle Systems specifically, it won't be further included in this thesis.

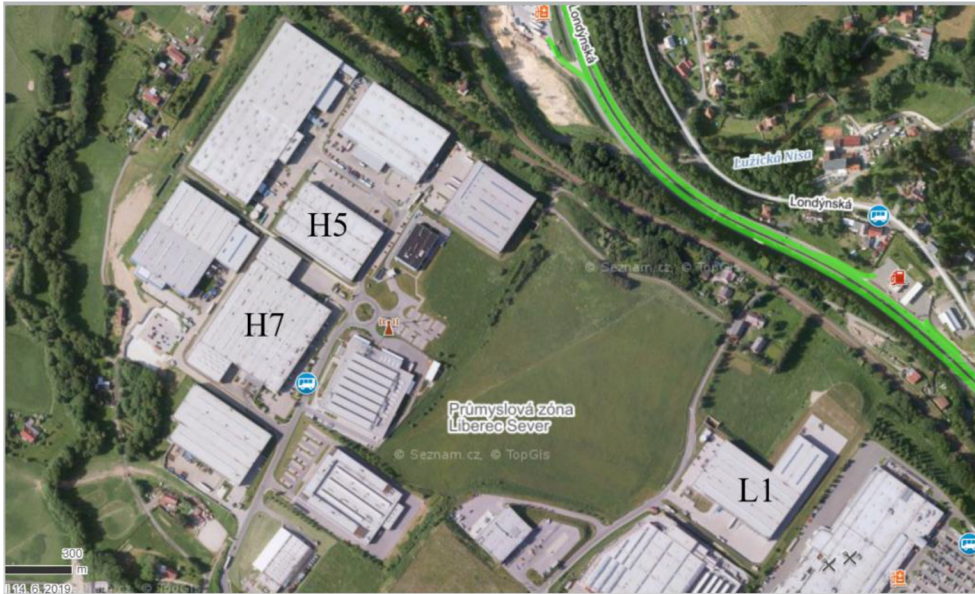


Figure 5 Map of KB in Liberec

Source: Mapy.cz (2021)

3.2 Product portfolio

KB Liberec is a manufacturing plant, in which the products of braking systems for commercial vehicles are made. The specificity of products manufactured in building H1 is wide. Products differ in technical and mechanical way. The manufacture is different and various components coming into the products. Whole product portfolio is as follows:

- Compressors;
- Air Treatment;
- Electronic Systems;
- Valves;
- Disc Brakes;

Compressors. All pneumatic braking systems, air suspensions and clutches in commercial vehicles use as the main source of energy the compressed air. The compressor itself is the main component of air providing. Compressors are driven by the vehicle's engine, by which is all the necessary compressed air produced for all the air systems. For hybrid or all electrical vehicles, the screw compressor is made for supplying the pneumatic system with compressed air. (KnorrBremse CVS; 2022)

Air Treatment. When compressor produces a compressed air, it must be cleaned and dried before entering up to seven different brake and subsidiary circuits. All these circuits are filled with up to three different pressure levels, which are secured from each other, to fulfil the highest safety demands in traffic without any issue. The most important product in this segment and for Liberec subsidiary are the Filter Cartridges. They are made for drying the air, so it protects the entire pneumatic system from freezing and internal corrosion. (KnorrBremse CVS; 2022)

Therefore, it ensures the operation efficiency and increases the overall lifetime of overall system. In 2004 KB CVS came with the Electronic Air Control (EAC). It combines the intelligent control together with pneumatics of decisive functions. Its field-proven software combined with component results in a significant reduction of fuel consumption as well as improved safety and comfort. There is a proven potential of saving 1250l/annually by using engine overrun phases, doing the regeneration process intelligently and by keeping the supply line between the EAC and the compressor closed. (KnorrBremse CVS; 2022)

Electronic Systems. As it is estimated that in European community would decrease annual deaths by 500 and injuries by 2,500 if all trucks and buses were equipped with electric systems, KB is pressing ahead with the development of all active and passive driver assistance systems. Among them are legally required antilock braking systems (ABS), electronic braking systems (EBS), electronic stability program (ESP) and adaptive cruise control (ACC). ABS prevents locking of the wheel, while the vehicle is braking. The extension of this system is the ASR, which ensures, that the wheel on the drive axel do not spin during accelerating. (KnorrBremse CVS; 2022)

It ensures optimal traction in all driving conditions. Both types are provided by KB in all commercial vehicles with air braking. Both ABS and ASR are integrated in EBS. The advantage comparing to conventional pneumatic control are shorter response time and braking distance. The enhancement of EBS is ESP. It causes automatic stabilization of the vehicle in critical driving situations, which leads to risk reduction of tipping over or skidding. Last system ACC ensures the correct distance from the vehicle in front, dependent upon the speed at which it is traveling. It prevents rear-end collisions and helps with road capacity efficiency. (KnorrBremse CVS; 2022)

Valves. They allow precise control of the compressed air supply to the brake and suspension systems. This product group includes foot and hand brake valves, brake pressure regulators, air suspension, relay valves, trailer control or selector valves which are used for operating with containers. It all covers all the requirements of a conventional braking system. (KnorrBremse CVS; 2022)

Disc Brakes. KB has already sold about 20-million-disc brakes all around the world. The reason behind is a significant development as monobloc design or the use of splined discs for reducing heat cracking, and other further improvements. This disc brake is a wheel is used for heavy goods vehicles as its total weight range of usage is from 6 to more than 44 tons. The main advantages comparing to conventional brakes are cost saving and improved safety hidden by compact design, low weight and even brake pad wear. (KnorrBremse CVS; 2022)

Actuators. Used in the braking system the aim of the actuator is to slow down or stop the vehicle by converting pneumatic energy into mechanical energy, which results in the friction material being pressed against the brake contact surfaces. (KnorrBremse CVS; 2022)

Table 1 shows each product group with its revenues from 2019, manufactured in KB CVS Liberec. Year 2019 is chosen due to the fact, that data from 2021 were not released at the time, when the table 1 was made. The reason for not considering year 2020 is that during that year due to the covid restrictions, revenues were significantly affected and so the data would have not been relevant to show the split of product groups in KB CVS Liberec.

Table 1: Revenues of product groups in thousands of CZK

	Compressors	Air Treatment	Electronic Systems	Valves	Disc Brakes	Actuators	Sum
Home Market	1 036	29 743	17 521	19 785	15 940	38 410	122 435
Remanufactured parts home market	8 514	23 005	9 480	5 294	15 228	15 608	77 129
EU	161 449	1 564 134	4 776	24 304	680 911	644 625	3 080 199
Sum	170 999	1 616 882	31 777	49 383	712 079	698 643	3 279 763

Source: Own processing according to Knorr-Bremse (2016-2020)

As seen in table 1, the left side split the table into three markets in which KB CVS Liberec delivers. The upper part of the table split the table as for the product groups. The biggest portion of KB CVS Liberec production includes the Air Treatment product group with its approximately 50% revenues. The main product of this segment is the filter cartridge

on which the automated product line was made. The second most important product group are Disc brakes with its 22% of total revenues. Only few thousand CZK behind Disc brakes are placed the Actuators. The share of total revenues is 21% in case of Actuators. About 93% of revenues are made by these three product groups from total of six. The remaining 7% are covered by the Compressors with its 5% share and 2-3% are divided between Electronic Systems and Valves.

Organizational structure

In KB Liberec are two types of departments (Figure 6). **First type** comes under the Knorr-Bremse Systémy pro užitková vozidla, ČR, s.r.o. (Knorr-Bremse Commercial Vehicle Systems CZ s.r.o.). These departments work for the Liberec plant. The basic workload is to keep production running and develop new projects related to Liberec plant. Between these departments belongs Quality department, Logistics, Human Resources, Accounting department, Facility department, Supplier Integration and Production department. **Second type** comes under KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH. The workload of these departments is not only related to KB Liberec, but also to all the other European locations of KB CVS. Between these departments belongs Category Purchasing department and R&D. These two departments are further described in following chapter.

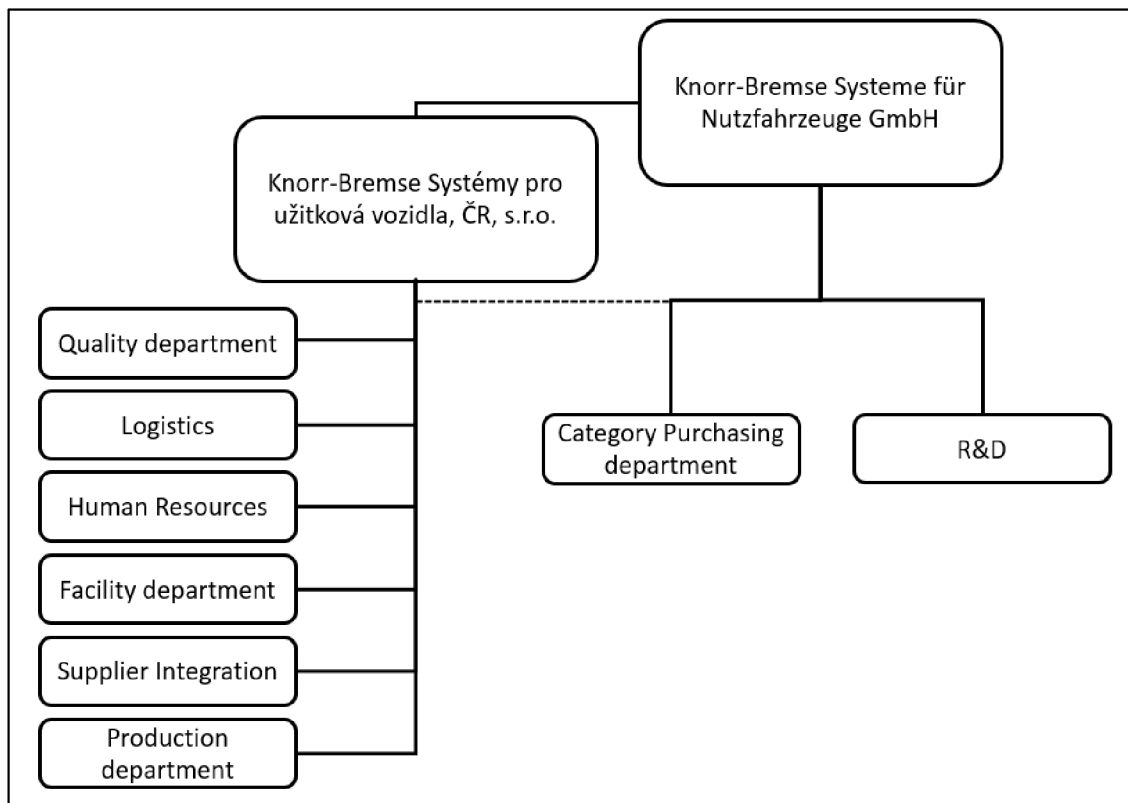


Figure 6 Departments located in KB CVS Liberec

Source: Own processing based on the internal data

Chapter summary

Knorr-Bremse AG (KB) is an international corporation, doing business in more than 30 countries. It is divided into two divisions, Rail and Commercial vehicle systems (KB CVS). KB CVS is a German company – KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH. This is a parent company of all locations in Europe, Asian Pacific, Brazil and North America. Among them belongs also Knorr-Bremse Systémy pro užitková vozidla, ČR, s.r.o. located in Liberec. The focus of this thesis is on the Category purchasing department located in this plant.

KB Liberec is located in the industrial zone Liberec Sever. This location is made of three buildings in which the main production, warehouse and remanufacturing are placed. The product portfolio of KB Liberec is made of Compressors, Air Treatment, Electronic systems, Valves and Disk Brakes. The main product is the Filter Cartridges. Thanks to this, the Air Treatment product group is the driver of KB Liberec with revenues higher than CZK 1,6 billion. (Annual Report, 2020)

Organizational structure in KB Liberec is divided between two types regarding the management. First type has responsibilities only for KB Liberec and the management is located in Liberec. Second type of department work for all locations of a parent company KNORR-BREMSE Systeme für Nutzfahrzeuge GmbH. The direct management is located mainly in Germany, but also in Hungary. Category purchasing belongs to the second type as its responsibilities are not only for KB Liberec.

4 Purchasing process in Knorr-Bremse

The following chapter is whole about purchasing process in KB CVS. On the beginning, the purchasing department in KB CVS is described and divided on its subcategories. The placement in the Uppsala (1977), and Stopford and Wells (1972) models is defined also in Purchasing department subchapter as it refers on the organizational structure of Purchasing department. Subsequently the purchasing process is described in detail with it four main parts:

- RfQ preparation³;
- process of obtaining offers;
- evaluating process;
- awarding process;

KB CVS is doing business in an automotive industry, which means that the quality of its products is important, especially in the case of braking systems and other products related to transport safety, as the overall safety (of passengers, pedestrians, etc.) is a priority. Purchased parts needed for manufacturing products must fulfill all the requirements (internal and external), so KB CVS may be sure they sell only top-quality products to their customers. KB CVS purchasing department has the responsibility for all the suppliers delivering any parts. To award some supplier with any business, all buyers must fulfill specific requirements and all this process takes few months depending on the urgency of specific project.

The following chapter focuses on the purchasing process at Knorr-Bremse, from the request for quotations from suppliers to the award of the contract to the most suitable supplier and the delivery of the first serial production to the KB CVS Liberec plant. This process is viewed from two perspectives. First one aims on the description of purchasing process focused on supplier located in EU. Whether the second one focuses on an “overseas” supplier from a low-cost country.

Firstly, the purchasing department of KB CVS is described with its responsibilities and main activities. Subsequently whole purchasing process is described and divided into a following parts. First part focuses on a request for quotation with the evaluation and

³ Preparation of all required data needed for the inquiry before sending to suppliers

decision making from the responsible buyer. Second part aims on the awarding process with detailed description of all the requirements needed to proceed. Third and final part describes the delivery of samples and of the serial production to the KB CVS Liberec plant.

4.1 Purchasing department in Knorr-Bremse

KB CVS is a highly internationalized company. Using the Uppsala model (1977), the degree of globalization is high as the locations of a German company are almost on every continent. The plants are located for example in China, India, or Brazil. These countries are according to Hofstede far away from similarity on a social level as seen on Figure 7. In two cases Germany differs significantly in comparison with other countries. German society is used to low power distance which means, that all people are equal without unequal distribution. In companies the leadership is required, whereas the control is disliked. In China, Brazil and India are people used to abusing of power by superiors as there is no possible defense against it. Society believes that inequalities amongst people are acceptable. (Hofstede, 2022)

Second dimension with significant difference is Individualism. Germany with its 67 points from 100 at the top is considered as with society used to focusing only on direct family. Germans are one of the most direct in the world in way of communication. They say only what they feel even if it hurts. In contrary Chinese are very collectivistic. Mostly they act in favor of a group and that is why they received only 20 points for this dimension. In other dimensions Germany differs in some cases only to one or two countries, but not all of them. This, together with a great geographical distance, confirms a high level of knowledge of foreign country markets, thus the high level of internationalization too. (Hofstede, 2022)

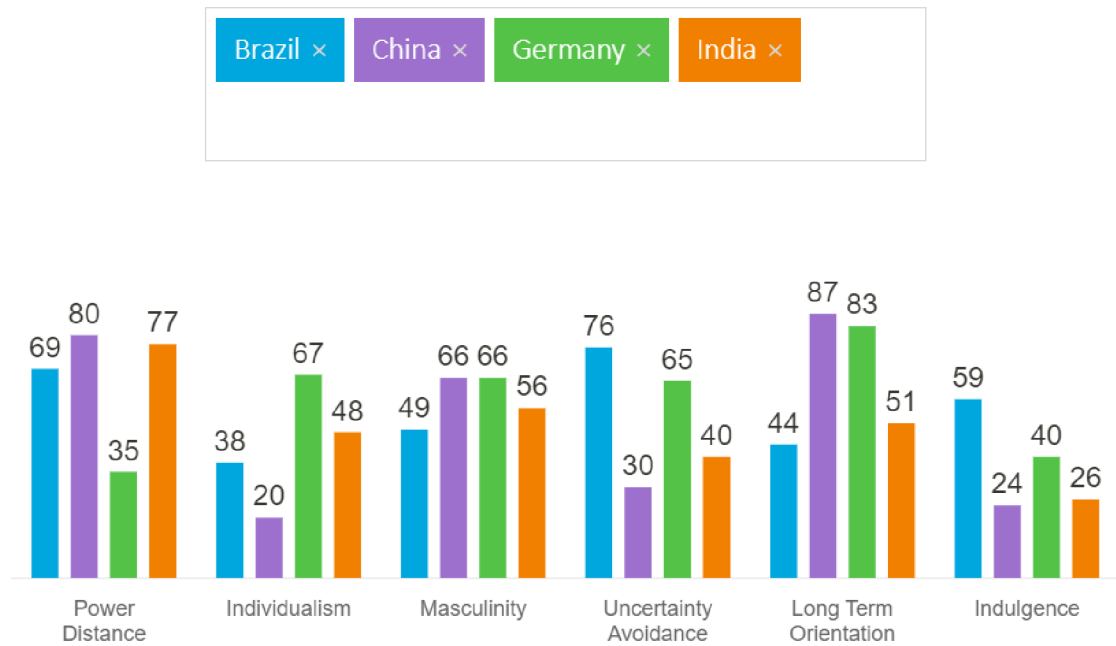


Figure 7 Hofstede cultural country comparison

Source: Hofstede Insights (2022)

The model of Stopford and Wells (1972) defines, that multinational companies should use the matrix structure in their organization, so there would be possibility of implementing dual strategies: product diversification and area diversification. The matrix structure is recommended only for companies with high degree of foreign sales and product diversification on foreign markets. KB CVS fulfills both conditions. It ranks as a highly internationalized company with its high degree of foreign sales, as many customers are from a foreign country. Among the foreign countries of the customers are France, Sweden, or Italy. As the product portfolio is wide as seen in Figure 8, the second condition of high degree of foreign product diversity is also met. This ranks KB CVS on a right top corner of a graph, which is related to a matrix organizational structure. By Egelhoff (1988) the matrix is specified as a product-regional matrix. However, KB as whole has a regional-functional structure. (Ellringmann et.al., 2006)

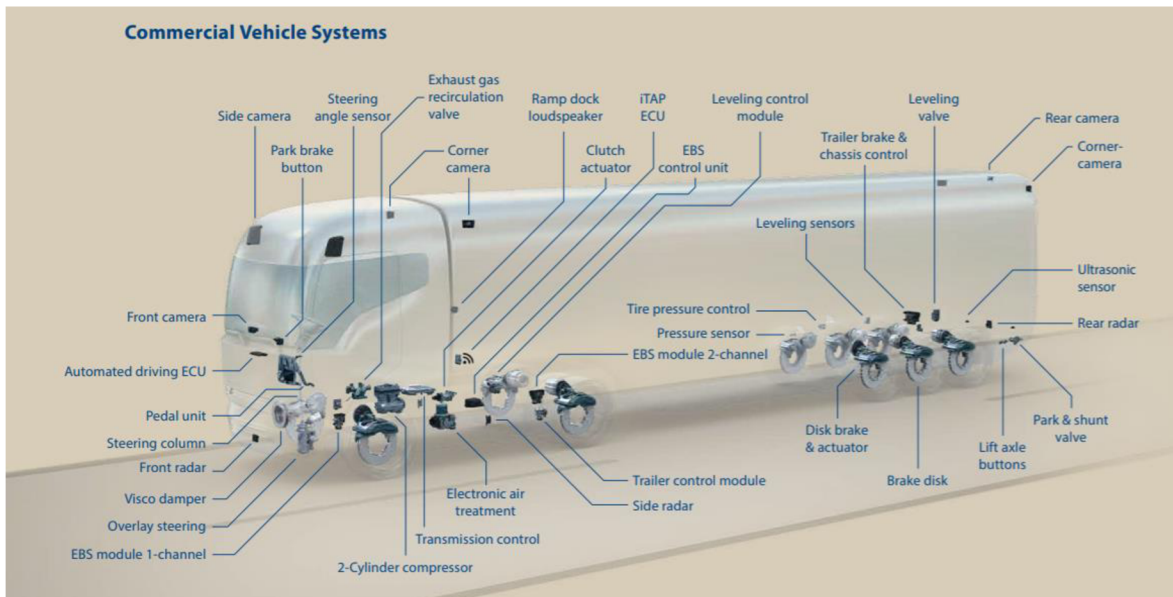


Figure 8 Products of KB CVS

Source: Annual Report (2020)

4.1.1 Split of Knorr-Bremse's purchasing department

KB CVS purchasing unit has the regional-functional matrix structure. The Regions are divided into five: Europe, North America, China, Japan and India. The functional units are divided into four parts: Global Category Purchasing, Global Project Purchasing, Global Supplier Development and Global Purchasing Governance. In following paragraphs all the subcategories will be described more in detail.

Purchasing Governance drives cohesiveness and efficiency to achieve targets by continuously improving structure, processes, performance reports, controlling and IT systems. Among the main tasks are:

- Creating project plans, templates and tools for purchasing support;
- Map and define processes to secure efficiency of tasks;
- Train new and current employees on processes, procedures and systems;
- Monitor purchasing performance and provide recommendations to organization;
- Increase productivity through digitalization;
- Drive continuous improvements within processes systems and tools;

Supplier development is responsible for developing new suppliers to meet the requirement of KB. This department also supports the Category management from a technology perspective. For new suppliers, compliance of the supply base must be verified regarding the quality, legal, customer and internal requirements and specifications. All activities are described as follows:

- Frequent assessment of supplier's performance and driving actions of improvements;
- Setting global targets for supplier quality;
- Technical expertise support of category management in case of supplier selection;
- Planning and executing VDA 6.3⁴ and Technology Audits for new suppliers;
- Driving cross-functional and cross-regional collaboration on supplier quality improvement initiatives;

Project purchasing team is responsible for leading the implementation of business-wide category sourcing strategies, achieved through project management of sourcing process, cost reduction, and productivity pipeline projects, supplier sourcing changes and other critical projects, all driving productivity. Some of the activities are described as follow:

- Supporting, planning and coordinating affective and successful global category sourcing strategies;
- Coordination of new product development projects across purchasing;
- Participating and engaging supplier host at the escalation meetings and driving de-escalation of critical supplier;
- Lead supplier transition project teams and coordinate engineering tests, quality reviews and manufacturing requirements;
- Facilitating implementation and effective changeovers with manufacturing facilities including tooling transfers and supplier PPAPs⁵;

⁴ VDA 6.3 is an in-depth manufacturing process audit tool acting as a guideline for performing audits. (Industryforum, 2011)

⁵ Production Part Approval Process (PPAP) defines the requirements for the approval of production parts, including production and bulk materials. (en-standards, 2022)

Last unit represents **Category Purchasing**, which is divided into seven categories. Each category is composed by families of similar products and materials or families of components. Each category aims to meet strategic objectives in terms of quality, cost, delivery, and commercial terms, as well as related sourcing strategies, cost reduction and supplier relationships. Further, detailed responsibilities are described:

- Overall category strategy and supplier portfolio management including analysis of supply base, management of RfQs ⁶and assessment of supplier offers and negotiation;
- Preparing and leading awarding process decisions globally;
- Analyzing supplier capacities based on demand planning;
- Driving improvement and executing cost reduction activities;
- Supporting plants for strategic and supplier performance issues;

All these units cooperate together to achieve the goals set by management. Every unit has specific responsibilities and tasks which after combining them together covers all the purchasing activities. In following chapters, the focus will be mainly on the Category Purchasing department and part of its responsibilities and activities.

4.2 Purchasing process

Purchasing process is a very broad and time-consuming activity, for which both parties (supplier and customer) are needed. This process involves many different activities, that are built on each other and results in a business between the parties. International purchasing process has the opportunity of involving more suppliers with diversified product portfolio. Thus, lower purchasing price or improved service support may be achieved. Not only these opportunities, but also risks related to international purchasing process will be described. This chapter focuses on whole purchasing process in KB CVS. It consists of four main parts: RfQ preparation, process of obtaining offers, evaluating process, and awarding process (Figure 9).

⁶ Request for quotation (RfQ) is an inquiry sent to suitable suppliers. The aim of RfQ is to get the offer on inquired part.

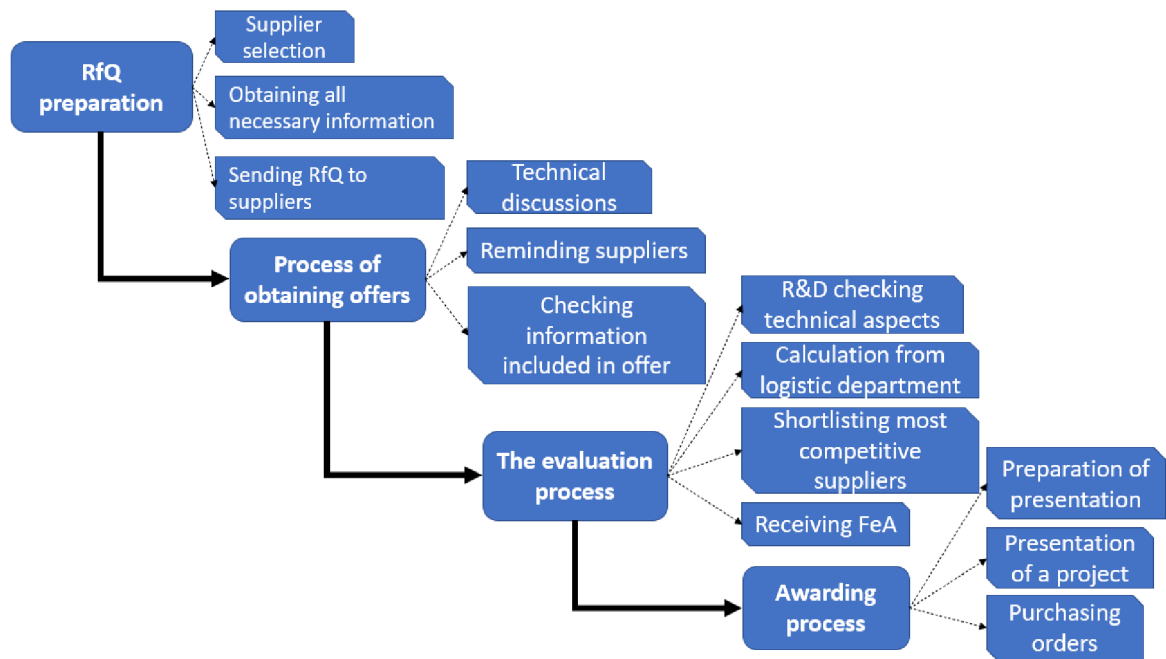


Figure 9 KB CVS's Purchasing process

Source: Own processing based on the internal data

In KB Liberec is located a part of the Category purchasing department responsible for European region. Other buyers are located in Germany and Hungary. Category buyers located in Europe are responsible for all European plants and all European suppliers. Other remaining regions have also its category buyers even though the size of each department differs. Remaining Category buyers are located in USA, India, China and Japan. The cooperation between all categories is important. Every region has different number of suppliers, so the cooperation during process of obtaining offers is necessary. As the China and India are low-cost countries (Radu, 2019), sometimes even with the delivery from these countries to European locations is advantageous. When the landed costs⁷ are cheaper from overseas supplier, then the cooperation between Category buyers from affected regions is necessary also during further purchasing process phases.

⁷ The total amount it costs the retailer to create the product, transport it and have the customer receive it. (Lopienski, 2020)

4.2.2 RfQ preparation

First activity in every purchasing process is made by Project Purchasing department. They request an item from Category Purchasing department. Specific category is chosen according to the material, type of part or the family of component. Responsible Category Buyer is in contact with responsible Project Buyer during the whole process. Category Buyer must go through the whole inquiry and decides, which suppliers are suitable for the specific part. Each Category Buyer has its own portfolio with specific suppliers. This decision is based on the buyer's experiences with supplier's product portfolio. Other aspects that play a role in decision making might be current situation of relationship, quality requirements etc.

When a buyer decides which suppliers should be involved in RfQ, then the RfQ is made. For requesting the offers from suppliers, KB uses an internal program made specifically for purchasing activities. For every supplier who is delivering to KB or even for every potential supplier, the accounts in this program are made. Suppliers have access to all RfQs in which they are invited. To make an RfQ, only filling specific information in cells is needed. It is usually made in one day. All information needed are included in the request from Project Buyer. Only filling the information into the internal program and deciding which suppliers should be included is needed.

Every RfQ should contain at least required annual quantities, part number with drawing or at least basic information needed for pricing, and location, in which the item should be delivered by supplier. Sometimes for more technologically demanding items, more information is requested by the supplier at the pricing stage of the process. Further specific information may be included in RfQ as start of production or the week, by when the samples must be delivered. Information vary from project to another, but there might be also specific requirements for suppliers regarding awarding bonuses. Awarding bonus is the requirement of one-time payment specified by certain percentage of the annual purchasing volume awarded to the supplier.

4.2.3 Process of obtaining offers

Process of obtaining offers begins, when the RfQ is ready and sent to all affected suppliers. The time period during which supplier may offer first quotation vary. Usually there is a period of 14 days, however in some cases the urgency of a project may shorten a given time limit and vice versa. During the offer collection, suppliers have the opportunity to contact responsible Category buyer, who sent the RfQ. Usually, supplier get in contact

due to the need of more specific information regarding the project or related to the technical specifications.

There are four types of status available at the time of the deadline. In best case supplier provides an offer. The opposite type is declining an RfQ. This occurs most likely due to the reason, that for the required product are not capacities, or there is a lack of technical equipment. Another status type is “accepted”, which means that supplier is working on a quotation, but the offer is not ready yet. Last type shows no action from supplier in the system. It means, that supplier didn’t open the RfQ, so there may be some issue with an account, or the supplier missed the e-mail, which notes about every new RfQ invitation. In this case, buyer gets in contact with the supplier and asks for a quotation via e-mail or by call. If a project is not urgent and the number of received offers is lower than two, then usually RfQ is prolonged till other offers are received. The need of three offers for each project is an internal rule.

Received offer should contain the price of a product related to the quantities mentioned in RfQ. Lead time and Incoterms are needed especially nowadays, as buyers need to know, whether the project timeline could be achieved and what type of transportation is needed. When supplier is not able to fulfill technical requirements, then it should be mentioned in quotation as a remark (different dimension, material, or coating⁸). This is also required in case the supplier offers another solution (different material or coating) for a product.

In some cases of expensive or complicated parts, a so called “cost breakdown sheet” (CBD) is required, where a supplier must fill in the details of production. It includes number of employees needed for production, material price, process price and the profit. After receiving CBD, KB cost analyst team together with Category buyers analyzes every point and evaluate it. If the prices and the process fulfill the expectation of cost analyst team, then it is approved by them. When it is not acceptable, the meeting with supplier is settled and the questions from costs analyst team are discussed. For these calls the R&D responsible employees are involved. In every call, in which the supplier is involved, the responsible Category Buyer must be involved or at least informed about it.

⁸ Coating is applied on surface. It should protect product against corrosion.

The process of obtaining offers usually takes from two, to four weeks. In case, there are no technical questions or remarks from the supplier or KB CVS, and all involved suppliers have quoted or declined the RfQ, then the 14-day time period is sufficient. However, this happens very rarely. Usually, some suppliers must be reminded to provide an offer or to decline the RfQ. Sometimes, some suppliers are overloaded and ask Category buyer to extend the deadline. This is acceptable only when the project timeline allows it. Therefore, two weeks are not sufficient.

4.2.4 The evaluation process

The evaluation process of all offers coming up next. Technical remarks or suggested improvements mentioned in a quotation are discussed with R&D department. If mentioned remarks or suggestions are not agreed from R&D side, then a supplier is asked for updating the offer right according to the requirements. Second point of evaluation is the lead time and Incoterms. The project timeline is very important and must be achieved. So, the lead time of samples and serial production is crucial and must be considered in decision making process. If supplier can't deliver the part at a given time, then unfortunately is excluded from the list of potential suppliers.

The Incoterms are important in considering whole purchasing costs. In case of European suppliers there is not a significant difference in term of logistic price. However, if the overseas suppliers are included in RfQ, then Category Buyer must be careful during the evaluation process. The types of Incoterms have a significant difference on a whole purchasing price. If an overseas supplier has considered in its offer the DAP (Delivery at Place) type of Incoterms, then the price remains the same. The target for Category buyers is to get and offer with DAP Incoterms. However, most of overseas suppliers are not willing to provide this offer at least in the first offer. Sometimes after discussions, some suppliers are able to provide also logistic service. Unfortunately, many suppliers are not able to deliver to Europe so KB logistics must cover the transport.

However, if in offer is the type of Incoterms FCA (Free Carrier) or EXW (Ex Works), then KB Liberec pays all logistic costs beginning from the supplier's plant. This means, that the offered price is not the final price. Also, the logistic costs must be calculated and added to the part price. This is a type of hidden costs, which must be considered in the evaluation process. To better understand the difference between each incoterm, the Figure 10 shows the

part of the delivery, for which the supplier (green) is responsible and for which KB Liberec (blue) takes the responsibilities.

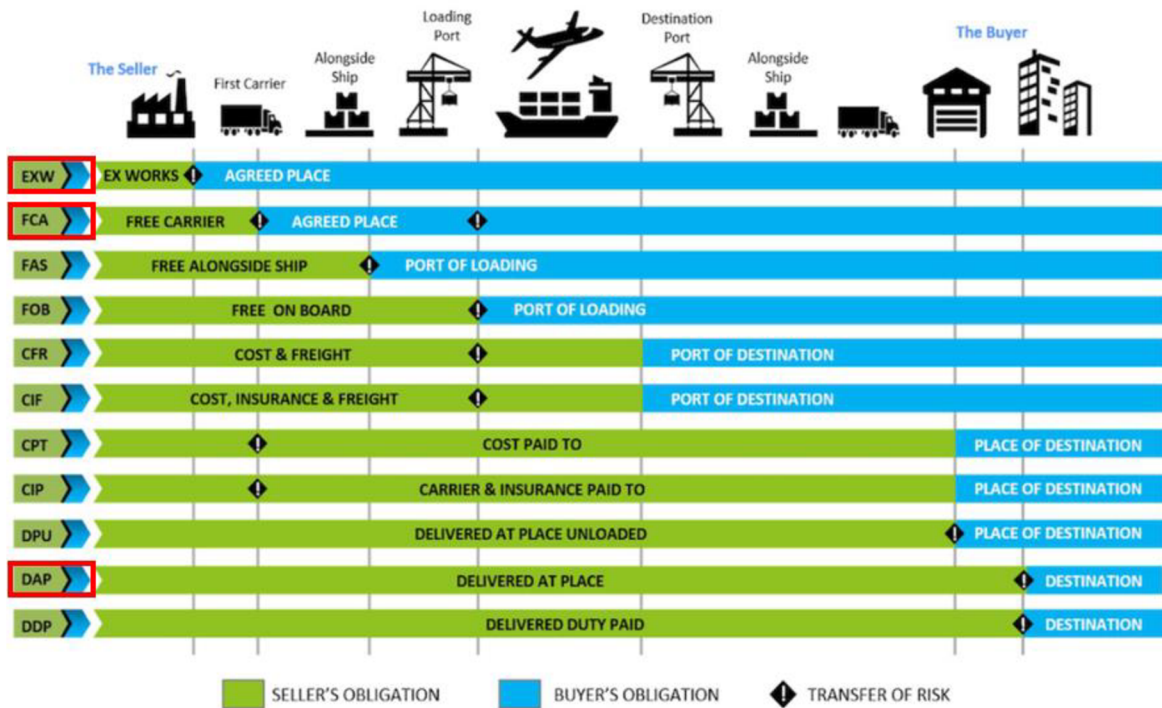


Figure 10 Most frequently used Incoterms in KB Liberec

Source: Anker-shipping, 2020

Most KB CVS overseas suppliers consider in its offer the FCA Incoterms, for which the offered price is not comparable to the prices of European suppliers. There are two ways how to solve this problem. Either the supplier is asked to recalculate the offer on the DAP Incoterms or if it is not possible, Category Buyer must contact responsible logistic department and ask them to calculate the logistic costs. Both ways are especially in urgent cases time consuming and may affect the project timeline.

If there are no limitations, all offers may be evaluated on a price level. Two or three most competitive offers are shortlisted. From these suppliers is required signed and filled KB internal document called “Feasibility study”, by which supplier agrees all the technical and delivery requirements. This assure buyers, that the offer is without any issues ready for further internal actions. In the Feasibility study document, suppliers also have to confirm the severity list, which is defined by R&D department during the PFMEA process. Process Failure Mode and Effects Analysis (PFMEA) looks at each process step to identify risks and

possible errors. This is a methodological approach used to identify risks in process change. (Carlson, 2022)

Process FMEA first identifies the process functions, failure modes and their effects on the process. For each failure effect, the degree of severity (danger) of the effect shall be determined. The severity of each effect is selected based on both process and design effects. The severity rating usually ranges from 1 to 10. Severity for Process Effects are related to the production process. Severities 2-6 are minor disruptions with need of reworking the product in station (severity 2-4) or out of station (severity 5-6). Severities 7-8 are considered as major disruptions with possibility of shutting down the lines in production. The worst case is included in severities 9-10, where is the danger of machine / tool damage or unsafe work conditions. (Arabian-Hoseynabadi, 2010, Carlson, 2022)

Severity for Design Effects are related to the function of a product. The lowest level (2-4) of severities has only a visual impact without any functional affect. Degradation or loss of function is included in severities 5-8, where the secondary function is affected in 5-6 and primary function in 7-8 severities. The worst case is in the highest severities (9-10) where are the regulatory or safety implications. In some cases, may occur so called “special characteristics”, which are related to a special request from customer or producer. If a demanded part has special characteristics or there are severities higher than 6, then suppliers without PSA audit cannot be awarded. PSA (product safety audit) is KB internal audit related to Product Safety Management. It helps to guarantee the fulfillment of all product safety-related requirements over the product life cycle. (Arabian-Hoseynabadi, 2010)

If the severity list is accepted from all shortlisted suppliers and the feasibility study is agreed and signed from supplier’s R&D, Quality and Sales departments, then it’s KB CVS turn. Firstly, the agreement through signature is needed from an R&D department. Finally, the signatures from Purchasing department and Quality department are required. Thereafter, the preparation for the awarding process is initiated by Category Purchasing department.

The evaluation process usually takes between one to four weeks in total. In urgent cases the one-week timeline is crucial. Every day some activity regarding the project is needed. From preparing the comparison sheet with all offers included, to the quality check of the Feasibility study from R&D side. In some cases, the evaluation process may take even some months. This occurs most often with the benchmark RfQs. Benchmark is a type of inquiry,

which should help to Category Buyers find out the market price of a product. It helps when the negotiation for new long-term agreement is coming up. In some cases, thanks to the benchmark RfQ Category buyer may achieve lowering of current price or avoiding to the price Increase.

4.2.5 Awarding process

When supplier proves, that the item offered by them is according to the requirements and the timeline is going to be achieved, further and final internal process is coming up. Awarding process is carried out by internal presentation of the case to the management. The aim of this process is to get an approval from all affected managers from different departments. If Category buyer gets the approval from everyone, then supplier is awarded and gets the business. Further step is ordering of the samples and PPAP. If the tests are successful and PPAP is approved, then the delivery of serial production is the final step of purchasing process. In further paragraphs the awarding process is described in detail.

The presentation contains approximately 10 slides. Through the slides Category Buyer introduces a whole case to the management so they get familiar with every detail. Every project must be described in detail so the management can evaluate all possibilities. Following information are necessary to have in presentation and discuss them in detail:

- The description of sourced item with its picture;
- The annual purchasing volume;
- The list of all suppliers involved in RfQ;
- Graph comparing the costs of the shortlisted suppliers;
- Basic information about awarded supplier;

The quality requirements in KB CVS highly important as the braking system which is made is safety critical element. However, as the braking system is not the only product in the portfolio, the requirements may differ with specific topics. All the audits required by KB CVS are as follows:

- ISO 9001
- IATF 16949:2016
- VDA 6.3
- PSA (internal audit)

For safety product the internal PSA audit must be done at the supplier production plant. PSA audit and the FMEA was already explained in previous part of purchasing process, so these terms won't be defined further. However, for better understanding of the requirements other audits are briefly defined in following paragraphs.

ISO 9001 sets out the criteria for a quality management system. The standard is based on several quality management principles, including a strong customer focus, motivation and involvement of senior management, a process approach and continuous improvement (ISO, 2022).

IATF is a group of an automotive manufacturers designed to provide an improved quality of products. In 1999 IATF together with ISO were aiming to achieve global integration of country-specific assessment and certification systems such as ISO 9001, VDA or even North American QS 9000 (Gruszka, 2017).

Last important quality audit is the German VDA 6.3. The focus is on process audits of production parts and services, whereas the IATF 16949 focuses on the system audit. In the VDA 6.3 audit comes three levels from the evaluation part. The best result from the audit is A 90%+. In this case supplier is quality capable and the Quality manager has no issue with approving. If the result is B 80% to 90% Quality manager also approves the case, but there are some actions to be done in future, as the supplier is only conditionally quality capable. In the worst case of achieving only C 80% and lower, supplier cannot be approved due to quality risk. (VDA, 2016) The best option for smooth proceeding is when supplier has all the quality audits. However, this is the best case and usually suppliers have only some of them. The audits are intertwined so having only some audits is not an obstacle.

The environment is a topic, which is especially nowadays discussed a lot and some regulations (as Green Deal) are going to be implemented or already are implemented by countries and intergovernmental organizations. The **environmental requirements** are important for KB CVS too. The environmental audit ISO 14001 is required from all the suppliers. It is Environmental management system aiming for enhancement of company's environmental performance (ISO, 2022). Supplier may avoid an ISO 14001 audit in case, they can provide a document about another environmental audit used in its country of origin.

The insurances are another important topic. Two types of insurance are mandatory in a certain amount. **Product Liability insurance** protects supplier in case the product they made and delivered caused some damage, loss, or injury to the user of a product. This should be the basic insurance of every automotive supplier. Second type is the **Recall insurance**. The recall is applied in case a safety-related problem regarding a product delivered to the customer occurs. In this case the defect must be rectified immediately. All affected products must be recalled, and the costs related to all this process should be paid by the producer. To be protected, this insurance plays an important role. KB CVS protects itself and its suppliers by requiring these insurances.

There are many other aspects required from supplier such as delivery insurance or long-term agreements signed with KB CVS. However, above mentioned are the most important aspects. Whole awarding process takes from two to six weeks, if the delivery of samples and serial production are excluded, as the delivery dates vary from project to another. The presentation should take only 30 minutes, however the preparation is needed together with the waiting time for the presentation time slot. Every awarding case must be announced to responsible employees.

The registration for the presentation must be done at least week before presenting. There are three levels of the awarding process depending on the annual purchasing volume of awarding products. If the awarding product or a package of products reach specific threshold, the case must be presented to higher responsible management too. If a purchase case is worth approximately €300k or €400k every year, category buyers must progress through all three levels. (Internal information) So, they must go through three presentation rounds for different levels of management. This is an isolated example, and usually these projects are strategic for the company, so TOP management must be involved.

If all affected managers from each department don't have any questions or remarks, the agreement of the topic is needed from everyone. Then the supplier is awarded and purchasing order of samples is made. The samples must be delivered on agreed date. Then the test should approve the suitability of a bought product. Together with samples, a PPAP is delivered. R&D department controls delivered PPAP and compares it with the tests, which are made inhouse. If all information is accepted and are the same with the results from R&D, then further steps could be taken. The purchasing order of serial production is the last point of purchasing process. Both purchasing orders are made by Project Buyers.

Chapter summary

The level of internationalization of KB CVS is on the highest level regarding to the Uppsala model and model of Stopford and Wells. Moreover, the organizational structure of Purchasing department in KB CVS fits to the model of Stopford and Wells. They recommended for companies at this level to have a matrix organizational structure which confirms the KB's regional-functional matrix structure used in Purchasing department.

Whole Purchasing department is divided into four parts. **Purchasing governance** continuously improves structure, processes, performance reports, controlling and IT systems. **Supplier Development** is responsible for developing new suppliers to meet the KB CVS requirements. **Project purchasing** is leading all projects related to the purchasing (cost reduction, sourcing process etc.). **Category purchasing** is responsible for supplier portfolio, purchasing activities etc.

Purchasing process is mainly covered by Category buyers and consists of four main parts. **RfQ preparation** is related to summary of all information supplier need to provide an offer. **Process of obtaining offers** contains technical discussions with suppliers, checking information included in offer and communication with suppliers. **The evaluation process** includes the assessment of price level, technical requirements with R&D department and shortlisting the most competitive suppliers. **The awarding process** is the last part of all purchasing activities and contains preparation of presentation, subsequent management presentation and purchasing orders

5 Assessment of the purchasing process

Following chapter focuses on the assessment of the purchasing process in KB CVS and further suggestions leading to improvement of the process. First subchapter aims to evaluate whole purchasing process and possibly find weak parts of the process. Specific parts of the process are chosen and subsequently described more in detail. The disadvantages and shortcomings are highlighted. The assessment of specific parts is further described, and the outcomes made from the evaluation are defined. In the second subchapter, proposed improvements, which are based on the outcomes of the evaluation are described and explained in detail. Conclusion is the last part of this chapter. The results with suggested improvements are summarized in this subchapter.

As seen in previous chapter, purchasing process is very time-consuming, as many activities related to sourcing are required. Whole process takes usually from 5 to 12 weeks. However, this is only rough estimate as every project differs in its timeline, urgency, and type of project. The purchasing process timeline is every time adjusted according to the urgency of a project. Most parts of purchasing activities are dependent on suppliers and its approaches. In following subchapter all parts of the purchasing process will be analyzed and evaluated.

5.1 The assessment of purchasing process

In following subchapter, all parts of purchasing process in KB CVS are analyzed and evaluated. The process of obtaining offers and, the awarding process are evaluated as well optimized. Thus, no proposal for the process improvement were not found. However, for the process of RfQ preparation and, the evaluation process the opportunity for improvements is real. These two parts of purchasing process are described more in detail.

5.1.1 Assessment of the process of RfQ preparation

It takes more or less one day as in case all important information are included in the request for quotation from Project buyer sent to Category buyer. However, in some cases might happen, that some information are missing. This leads to delay of whole process. The length of delay depends on the type of missing information. If the information is related to the project data⁹, the Project buyer should be acknowledged by all these data. Thus, the delay

⁹ Data related to the project timeline – Start of production, End of production, PPAP date etc.

may last from few hours to few working days, depending on speed of reply. However, if the Project buyer is out of office for few days, there is no chance of getting response. This may affect the project timeline of urgent topics.

If the missing information is related to technical type, then the need of answer from R&D team is required. This means that there is a need of four e-mail on top. Again, depending on the speed of reply, the delay may last from one to two or three working days. Figure 11 shows whole process of finding out the missing information in for both types (project related and technical) of missing information.

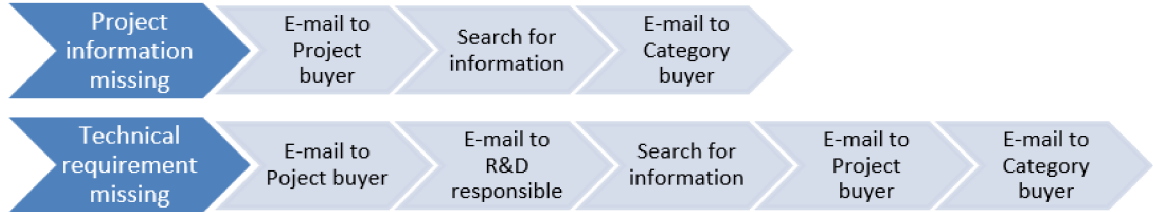


Figure 11 The process of finding out missing information

Source: Own processing based on the internal data

There is no template used for filling the information on the Project buyer side. All information Category buyer receive are written in points in e-mail, but the number and types of information included differs with every request. Without any template Project buyer may forget some information needed for RfQ, thus further discussion is needed, and the project timeline might be affected. In this part of purchasing process is a potential of improvement. In further subchapter the proposal for improvement of this specific part is described in detail.

The process of obtaining offers cannot be much influenced by Category buyers. They can only support suppliers with technical or any additional information requested by them. The main driver of this part of the process is the supplier’s approach. Supplier’s approach differs a lot depending on annual quantities required by KB CVS. Some items have the annual quantities in the hundreds of thousands and some even in millions. In this case suppliers are very proactive and are trying to meet all needs required to be awarded, as there is opportunity of huge business for them.

However, there are also projects with small volumes. They might be even only about few thousands per year. These projects are not the priorities for suppliers as the purchasing volume is too low for them. Thus, for small volume parts is sometimes too hard to get any offer before the RfQ deadline. The only activity which can be done, is to contact suppliers and kindly ask them for an offer. The process of obtaining offers is optimized and author see no possibility of a significant improvement, which could speed up the process.

5.1.2 Assessment of the evaluation process

Is the most important part of whole purchasing process. In this part of the process Category buyer decides which supplier is going to be awarded. Evaluation process takes usually between 1-4 weeks. It is all depended on information availability. If Category buyer have all needed information for shortlisting two or three suppliers, then the process takes about one week. In first day, Category buyer compares all offers and decides which suppliers should fill and send the Feasibility study, so the quality check from R&D department may be done. Category buyer usually receive the Feasibility study and forward it to the R&D department in two or three days. The final check from R&D is done in one or two days depending on the urgency of a project.

However, many offers are not comparable with others due to different Incoterms. Suppliers from overseas countries such as China and India often offer on Incoterms FCA or EXW. In this case these prices with that from European suppliers are not comparable. Thus, logistic costs must be calculated, so Category buyer can compare all offers. Logistic costs must be calculated by logistic department of affected plant. This process is time consuming for purchasing department and for logistics. Category buyer must write an e-mail to logistic department with a request of calculation. The needed information are addresses of all suppliers, part numbers, quantities of demanded items, packaging instruction and Incoterms of all offers. To get all these information Category buyer needs approximately 8 minutes on one item.

In KB Liberec only one person can calculate logistic costs, so if this person is not working (illness, holidays) whole process is on hold. In urgent cases this may affect whole purchasing process. If the person is working and has no other urgent topics, the calculation for one supplier and one item takes about 10 minutes. Every further calculation for the same item but for other suppliers takes another 7 minutes per each supplier. In every RfQ on average 10 suppliers are involved, from which four are from China or India. Thus, whole logistic

calculation takes about 30 minutes on one item if only overseas suppliers are calculated. However, on average every RfQ includes two items. This double whole process to 60 minutes.

There is also second option, how to get a comparable price to the European prices. Category buyer may request an updated offer from supplier on DAP Incoterms, so the logistic costs would be included in the piece price. However, suppliers are not able to re-calculate their offer in one day, as they must forward this demand to other departments. Additionally due to the different time zones comparing to overseas suppliers, the communication is not easy. In east China is +6 hours comparing to Czech Republic. Due to this fact, even the supplier would be able to recalculate the offer in one day, one day is lost due to the time change as the offer would be accepted in Liberec second day. Both options are shown on Figure 12.

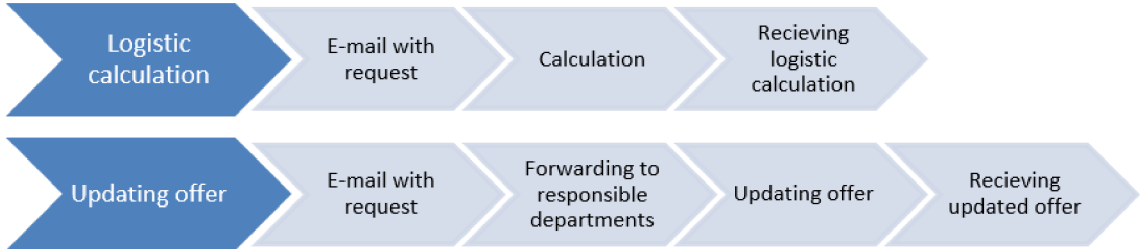


Figure 12 Process of receiving comparable item price

Source: Own processing based on the internal data

When landed costs are compared, two or three suppliers are shortlisted, and the Feasibility study is requested. The safety of products is the priority for KB CVS. So, after receiving the feasibility study, all technical requirements are checked by R&D team in detail and possible misunderstandings are discussed with suppliers. At the end, one supplier is awarded for specific project. Supplier selection is based on pricing level, lead time and in some cases these two aspects are equal for some suppliers, Category buyer’s experiences with each supplier are considered.

Awarding process is the last step of whole purchasing process. It’s main part is the presentation of a case to the management board. The preparation of presentation takes about two or three days. Most of the information needed for presentation are about nominated company. Quality checklist, performance overview and basic information are the main

drivers. Another information are related specifically to the project. Responsible members of the management must know whole context of the purchasing activity to decide whether an agreement or rejection will be their final word. Presentation takes 30 minutes.

However, Category buyer must register the presentation at least week before presenting. This is due to the planning of management calendars. There might be three levels of presentation on top, if the case is too expensive, the top management must agree the terms. Whole process cannot be shortened in any way as it is due to internal rules. The purchasing order of samples, PPAP and serial production and further testing the samples are not responsibilities of Category purchasing department, so these topic won't be further described.

During the assessment of KB CVS purchasing process, two parts very identified for possible improvement. Figure 13 shows both parts marked in orange. In RfQ preparation process, the sub-process of obtaining all necessary information was identified for improvement. Second suggestion is related to the sub-program of calculation from logistic department, belonging to the evaluation process. These activities are going to be further analyzed and the proposals for the process improvement will be stated.

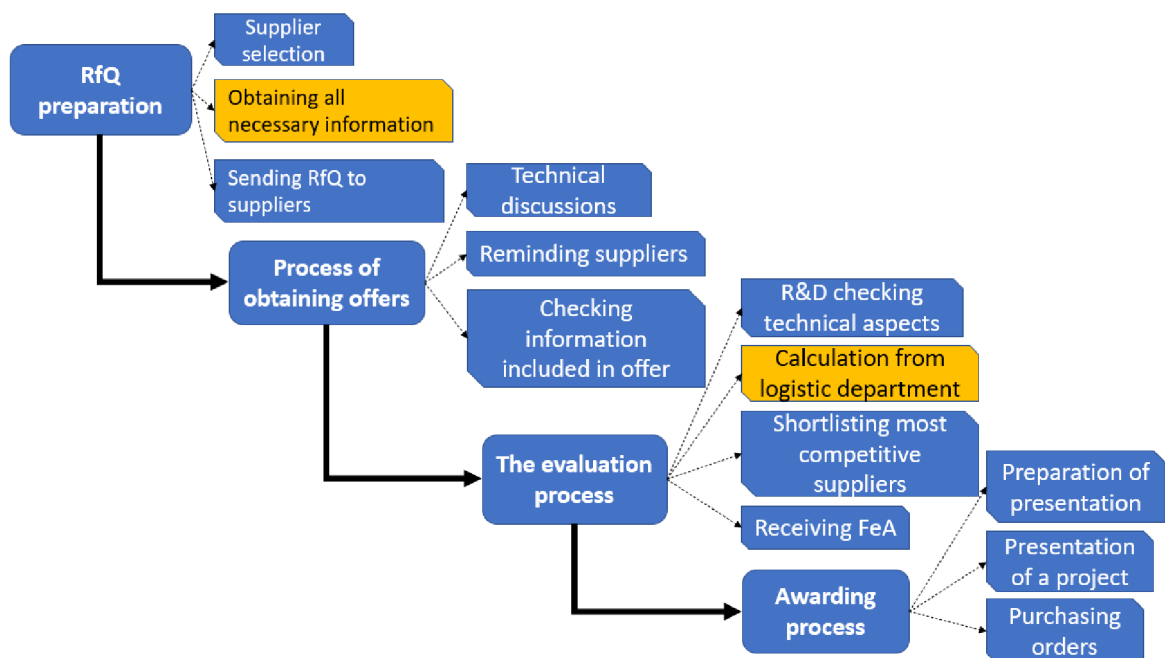


Figure 13 KB CVS purchasing process after evaluation

Source: Own processing based on the internal data

5.2 Proposal for process improvement

Purchasing process in KB CVS is a long-term activity with a predetermined procedure. Every purchasing case must come through all four parts to successfully close its process. However, every case is unique and in each part of whole process are some details solved differently. For these details Category buyers cannot be prepared. Nevertheless, there are two specific parts, which might improve the sourcing process and speed it up, so timelines are achieved.

5.2.1 Proposal for RfQ preparation process

The excess activity explained in previous subchapter may be reduced by using of the proposed table (Table 2). This table is made for the Project buyers and their requests for offers sent to Category buyers, who make the RfQ based on this information. Every information needed for pricing a specific part is included in this table. By filling empty columns, Project buyer won't forget any information so it would help to avoid the process shown in Figure 11 is excluded from whole purchasing process.

Table 2: Proposed table for the content of all important information

Important information needed for RfQ	Columns with filled information
Responsible Project buyer	
Responsible R&D person	
Name of part	
Part number	
Required quantities	
Location of KB production	
Required material	
Required coating	
Samples date	
PPAP date	
Start of production	
End of production	
Other special requirements	

Source: Own processing based on the internal data

Table includes information about responsible project buyer and R&D person. For Category buyer is then easier to look up the names in notes instead of searching in e-mails and then directly contact them in case of need. Information about sourced part are important for suppliers. The part number and part name must be included in official offer, so also supplier needs to know it. For considering the price, supplier must know annual quantities

and location for delivery terms. Annual quantities are important, because higher quantities reduce fixed costs and so the product price should be also cheaper. Location is needed for considering production in closest supplier’s manufacturing location and also in case supplier offers DAP Incoterms.

Technical requirements are important in case, KB CVS requires specific material or specific coating. The dates of samples, PPAP and serial production are needed for both Category buyer and suppliers. Category buyer adapts the activities to the timeline. Supplier must know if the production is possible in specific timeline or not and specify it in offer. Last column is made for other requirements (color of product, number of cavities etc.), which should be considered in offer or by Category buyer.

5.2.2 Proposal for the evaluation process

As both options of receiving comparable item prices is time consuming and may affect the project timeline, the solution of this issue is the excel file. Thanks to this file, the Category buyers would be able to calculate approximate logistic costs. The aim of this calculator is to possibly eliminate at least some overseas suppliers from shortlisting by showing a price, which is much closer to the real landed price. Thanks to this calculator, buyers may eliminate overseas suppliers much faster without the additional activities shown on Figure 12, which could slow down whole process.

Europe Transportation	To fill
Destination	
Weight of pallet in Kg	
Number of items on pallet	
Piece price	
Non Europe Transportation	To fill
Destinention (Supplier)	
Destination (Closest port)	
Weight of pallet in Kg	
Number of items on pallet	
Piece price	
Ship Transportation	To fill
Port	
Number of items on pallet	
Piece price	
Total piece price	

Figure 14 Table in excel file calculator

Source: Own processing based on the internal data

On Figure 14 is shown a table from the calculator. There are the only three tables needed for the calculation. All other lists needed for whole calculation contain sensitive information and cannot be shown in this thesis. Columns colored by light blue must be filled by Category buyer. These are related to the number of items per one pallet and the price of one item. The information of the number of items per one pallet is mentioned in packaging instruction, which are every time received from Project buyer. The price of one item is written in every offer. For columns filled with grey, the rule is made, so Category buyer only choose from offered data. Finally, the green cells will show at the end piece prices at each part of the calculation and the “Total piece price” in the end. The “Total piece price” shows the sum of all the piece prices from each part of calculation and also the piece price offered by supplier.

The calculation of this excel file is made possible thanks to the pricing lists of logistic companies working with KB CVS. The pricing lists contains the prices from every supplier, KB CVS is doing business with, to Liberec plant. The prices are divided on the weight of the pallet, so the weight must be chosen by Category buyer. More the pallet weights, more expensive the delivery is. For these calculations is considered fully loaded truck also with other parts. The price from pricing list is made on whole pallet, so the number of items on pallet is also required, so the costs could be calculated on one item. Calculation of the truck transportation in Europe and other regions is the same with only one difference. In case of European transportation, the final destination is every time Liberec. However, for other regions final destination is one of the ports used by the logistic company.

The ship transportation is calculated through the cost provided by logistic company working with KB CVS. Prices are based on the ports often used by KB CVS in China, India and Europe. The price is calculated on a container, as KB CVS uses the Full Container Load (FCL). The container is a standard 40'. In this type 24 euro pallets may be placed. The price is automatically divided by 24 as author counts with full loaded container. The number of items on one pallet must be filled so the piece price is calculated. The port must be also chosen. It is the port from which the container is shipped. The port of delivery is still the same for KB.

The limitation of this calculator is that only the transportation costs are calculated. Thus, when the price of an overseas supplier is lower than the price from the European even after adding the price from calculator to the original piece price. Then the logistic costs from logistic department should be required from both, European and overseas suppliers, to get the most reliable comparison. However, if the piece price after adding the price from calculator is same or higher than the price from Europe, an overseas supplier may be excluded from the shortlist, as other additional logistic costs (packaging, stocking etc.) would further increase the price.

Whole process of calculating the approximate transportation costs takes about 5 minutes on one item and one supplier. To calculate the price for another supplier for the same item, further 3 minutes are needed. To calculate an RfQ of two items and four overseas suppliers would take about 30 minutes. Comparing to the calculation of whole logistic costs there is a time saving of 30 minutes for logistic responsible on one RfQ. The time comparison is shown in Table 3.

Table 3: Time spend comparison on one RfQ

	Category buyer	Logistic responsible	Additional time	Total time
Request of updated offer			1 day +	1 day+
Logistic calculation	15 minutes	60 minutes +		75 minutes+
Proposed calculation	30 minutes			30 minutes

Source: Own processing based on the internal data

Table shows the comparison of all three possibilities of ensuring comparable price for one RfQ. In case of requesting updated offer, one day is the minimum due to the time shift. If there will be longer waiting time, depends on the supplier, and Category buyer cannot influence this delay. In case of logistic calculation by logistic responsible, Category buyer must write a request with many needed information, so the time spend on this request is about 15 minutes. Logistic responsible spends approximately 60 minutes on calculating one RfQ. However, Category buyer cannot influence whether logistic responsible starts the calculation right after receiving the request or not. The total time is minimum 75 minutes. In case of proposed calculation, Category buyer calculate the costs him/herself in 30 minutes, so there is no other delay.

Summary

The assessment of purchasing process was made based on a personal experience of the author. The process of obtaining offers and the awarding process were evaluated as sufficient. There is no possibility of improvement, which would speed up the process or make it more accurate. However, during the assessment of RfQ preparation process and the evaluation process, two sub-parts were identified that slow down the process. For these, proposals on improvements were designed. A detailed description was followed by a time-based assessment against the current situation.

Both suggestions should help to improve the purchasing process. The time that can be saved by adding both improvements together may in some urgent topics safe whole case. The time saved by Table 2 made for the RfQ preparation process may vary from one to three days depending on the speed of replies from affected people. By this improvement, Category buyer ensures, that there are no delays in the RfQ preparation process. It will also increase the accuracy of activity. There is no place for misunderstanding and redundant activities shown in Figure 11 are removed.

The calculator of transportation costs may safe at least 25 minutes per one RfQ. On average, every Category buyer has 5 RfQs per month. In chosen Category are 5 buyers in total. Monthly, proposed improvement may speed up the purchasing process by 10 hours and 25 minutes. However, this is the lowest limit. In the absence of the person responsible for the logistical calculation, the delay may be extended by several days. The same applies to requesting an updated quotation from the supplier. There is a one-day lower limit to the time saved in the purchasing process, but this time can increase for many reasons.

On Figure 15 is shown the improved purchasing process in Knorr-Bremse Commercial Vehicle Systems. In process of RfQ preparation, whole sub-process of obtaining all necessary information is removed. Suggested Table 2 includes all important information for supplier, so there is no further need of information searching before sending the RfQ to the suppliers. Second improvement in the form of calculator (Figure 14) enhanced the calculation sub-process included in the evaluation process. In most cases there is no need of absolute logistic calculation made by logistic department, thanks to the proposed calculator, which can be filled by the Category buyer.

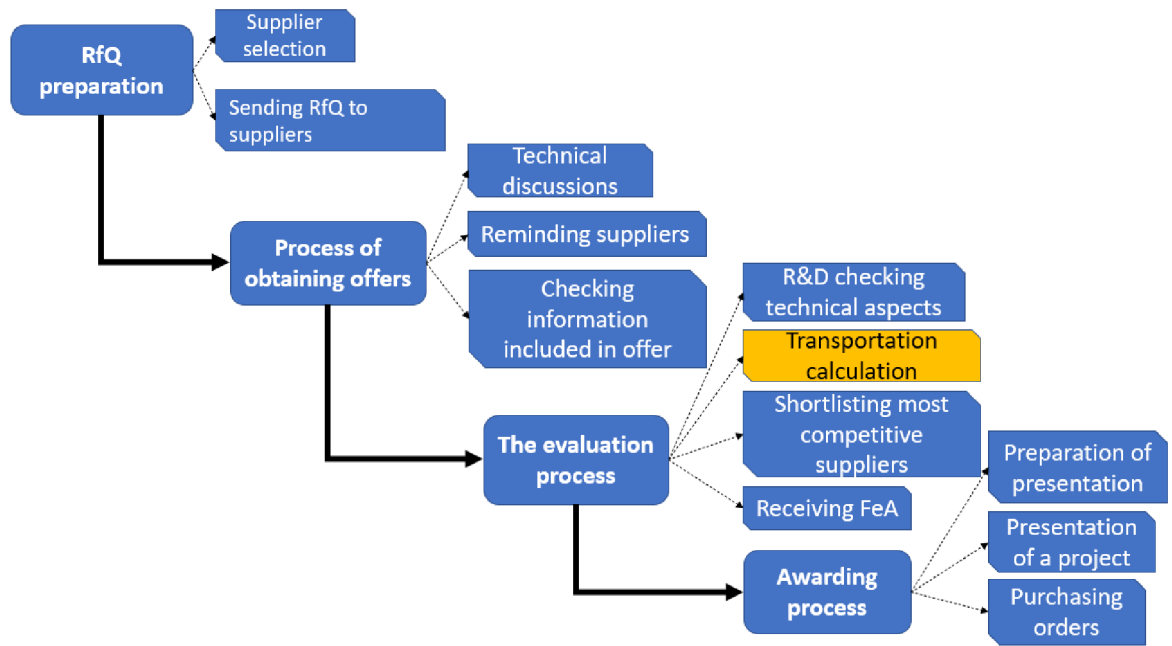


Figure 15 Purchasing process after proposed improvements

Source: Own processing based on the internal data

Conclusion

The last few decades turbulently changed the position of the purchasing department in the corporate strategy. From a passive role in the business organization, with only an administrative function, the purchasing department has been integrated into the corporate structure since the global market has been growing. The main targets were related to the improvement of product quality and purchasing cost reduction by cooperating with foreign suppliers. European automotive companies were focusing on low costs countries, mainly in the APAC. Some of their production facilities were built near to the suppliers. However, the main portion stayed in Europe, so the whole supply chain had to adapt.

The last three years showed us how production is interconnected with regular deliveries. When the supply chain was somehow interrupted, the logistic department had great difficulty in maintaining production. The deliveries were often delayed due to the lack of employees during the Covid 19 pandemic. Nowadays, another complication for the supply chain appeared. Material shortages have set a new standard for the automotive industry. Companies must adapt to this new situation by acting quickly. Purchasing department faces a completely new challenge. To avoid the production stoppage, buyers must often operatively find a supplier who is able to deliver the required product at a given time. For this, a precise and fast internal process is essential.

For this reason, the aim of this master thesis was to analyze the current purchasing process of Knorr-Bremse Commercial Vehicle Systems and subsequently evaluate the speed and accuracy of each activity involved in the process. Emphasis was also placed on suggesting possible improvements to accelerate and improve the overall process. The proposals were evaluated by calculating the time required to complete a specific activity and subsequently compared to the current time spent on the chosen part of the purchasing process in Table 3.

At the beginning of this theses, the term globalization was briefly described. The global market is essential for every country to improve the standard of living for its habitants. The reasons why countries should become globalized were therefore described in detail. Since this thesis focuses on a company, thus the reasons why companies should join the global market are listed in the first chapter. Subsequently, the term internationalization is defined. The expansion patterns showed us that Knorr-Bremse CVS is a highly internationalized company being ranked on the highest level. Continue to main internationalization models

are written out, and ad are used to evaluate the level of internationalization of the chosen company.

The Uppsala model (1977) shows that Knorr-Bremse, with subsidiaries on four continents out of six (excluding Antarctica), is a highly internationalized company. To manage so many branches in different regions, KB CVS needs a lot of knowledge. All two patterns of the Uppsala model confirm this statement. Firstly, the establishment of the chain is complete as the manufacturing is settled in every region mentioned. Secondly, the high psychic distance is confirmed via Hofstede's cultural country comparison. By including KB CVS into the Stopford and Wells (later modified by Egelhoff in 1998) graph, Knorr-Bremse is situated in the top right corner. It shows the high level of foreign sales together with a highly diversified product portfolio in a foreign market.

Furthermore, the focus was on international purchasing. As it was already stated, purchasing is a very important activity for international corporations. By implementing purchasing into their corporate strategy, they can reduce the purchasing costs significantly. Nowadays, much more important responsibility appears. Solving the lack of material deliveries is crucial so that they don't experience a production stoppage. Thus, all the responsibilities of purchasing department with its activities are described were described in the second chapter. Followed by extending the purchasing activities and responsibilities, together with the possible risks in a foreign market, the second chapter was concluded.

In the third chapter, the company Knorr-Bremse Commercial Vehicle Systems was introduced. All locations were stated, showing the degree of internationalization of the company. Subsequently, the focus was on the chosen plant located in Liberec, Czech Republic. There, a part of purchasing department is positioned. Thus, the product portfolio of KB Liberec was described, so the reader can better imagine the purchasing process. Finally, the definition of organizational structure in KB Liberec was drawn up.

Subsequently, the purchasing department with all its European locations as described. It is divided into four parts which were defined. The main aim was on the Category purchasing department, which is mostly responsible for the sourcing activities. The whole purchasing process was explained through four follow-up parts with specific activities. The whole purchasing process takes between five to twelve weeks. It is the time between the inquiry preparation and the point when a supplier is awarded a business. The time range

is so wide due to the fact that every purchasing case is completely different, and the urgency differs.

The last chapter focused on the assessment of the purchasing process and subsequent improvement proposals. Of the main four analyzed parts were, two of them evaluated as optimal. There were not found any possible improvements from the Category buyer side. However, in the remaining two parts (RfQ preparation process and the evaluation process) gaps for improvement were found. For the acceleration of a process, two documents were made. The document related to the RfQ preparation process contains a table including all the information supplier needs to know for offer preparation. The project buyer should fill all required columns with specified data. This can speed up the whole process of preparing

a purchase inquiry by several hours to days. It depends on how long it takes all the workers involved to respond. Additionally, it saves the redundant work, shown in Figure 11, to a Category buyer and all involved employees.

Often overseas suppliers include in their offer the FCA or EXW Incoterms, which makes the comparison with European suppliers impossible. This leads to further activities (request of updated offer or request of logistic calculation) that delay the whole purchasing process. Thus, the document related to the Evaluation process contains a calculator of transportation costs. All needed data were received from logistic companies working with KB Liberec. These price lists include the prices related to all locations of all suppliers delivering to KB Liberec. The only information needed to be filled in to enable the calculation is shown in Figure 14.

The formulas subsequently calculate the total piece price, which then shows the competitiveness of overseas suppliers compared to the Europeans. If the total piece price of overseas suppliers is the same or higher compared to the European suppliers after the calculation, then the supplier shouldn't be involved in the shortlist of most competitive suppliers. Even though the price is the same, the supplier is most likely more expensive, as the remaining costs (packaging, duty, storage, etc.) would further increase the total price.

This comparison can speed up the evaluation process by at least 45 minutes by removing the need for further steps, as shown in Table 3. However, at least one day is more likely as the logistic calculation is not the priority for the logistic department. The need of an updated offer to DAP Incoterms from a supplier or logistic calculation from the logistic

department is removed from the process. A whole overview of saved activities is shown in Figure 12. Overall, the two proposed improvements can speed up the purchasing process by approximately 1 to 4 days per RfQ . Given that the purchasing process takes on average 5 to 12 weeks, the saving of four days represents a significant improvement that can save urgent cases.

A smooth process and reduced workload are important aspects these days when material shortages and delivery delays threaten production. The response to these situations must be immediate and quick. By implementing proposed improvements in the purchasing process, Knorr-Bremse Commercial Vehicle Systems may avoid problematic situations caused by the delay. These proposals not only speed up the process but also help to avoid delays in the process by third parties.

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