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Sourcing Steel Parts in China

Risks and Opportunities for the German Special Machinery Industry
illustrated by the example of BAUER Maschinen GmbH

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ABSTRACT:

Steel Prices in Europe rise and are subject to global crises such as Covid-19 and the invasion of Ukraine. Consequently, machinery producers look for alternative sourcing opportunities abroad. Prices in China appear to be lower and more stable. Special machinery producer Bauer Maschinen GmbH in Germany wants to check if a purchasing strategy for steel parts in China is worthwhile. To achieve this, a three part strategic analysis is carried out: First, evaluate internal and external inputs, second, formulate strategic alternatives via SWOT analysis, and third, select the best alternative through Multicriteria Decision Analysis. A mixed-method approach combines qualitative and quantitative sources. Expert interviews are combined with Statistical Data to triangulate conclusions. External input shows that the Chinese sourcing market is characterized by favorable economic conditions. Cost saving potential is promising, but administrative work rises. Internal Inputs show that Bauer Maschinen GmbH takes quality leadership while also having low negotiation power due to low output volumes. Existing production facilities in China help Bauer Maschinen GmbH to develop close supplier relationships. Out of all alternatives, a Safeguarding strategy is chosen for further development. Safeguarding is characterized by gradual development of sourcing in China, while simultaneously securing the supply chain. A contingency plan serves to shield the company against interruptions and crises.

KEYWORDS: China, Sourcing, SWOT-Analysis, Risks, Opportunities, Multicriteria Decision Analysis

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Abbreviations

BMA	Bauer Maschinen GmbH
BRI	Belt and Road Initiative
CBAM	Carbon Border Adjustment Mechanism
CCP	Chinese Communist Party
CNY	Chinese Yuan Renminbi (also known as RMB)
CPC	Communist Party of China
CPEC	China-Pakistan Economic Corridor
CSRD	Corporate Sustainability Reporting Directive
EFE	External Factor Evaluation
EPSI	Environmental Policy Stringency Index
ESG	Environmental Sustainability Goals
ESRS	European Sustainability Reporting Standards
GmbH	Gesellschaft mit beschränkter Haftung (engl. Limited liability company)
GDP	Gross Domestic Product
IFE	Internal Factor Evaluation
KPI	Key Performance Indicator
MCDA	Multicriteria Decision Analysis
MFE	Mixed Factor Evaluation
MMA	Mixed-Method Approach
MNC	Multinational Corporation
PPI	Producer Price Index
PRC	People's Republic of China
QSPM	Quantitative Strategic Planning Matrix
ROC	Republic of China
SAC	SAP Analytics Cloud
SAP ERP	SAP Enterprise Resource Planning
SAP GUI	SAP Graphical User Interface
SCM	Supply Chain Management
SCR	Supply Chain Resilience
SFAF	Strategy-Formulation Analytical Framework
SSI	Semi-Structured Interview
UHB	Unternehmenshandbuch (engl. Corporate Handbook)
YI	Quality Notification for Internal Defects
YQ	Quality Notification for External Defects/Supplier Defects

1 Introduction

1.1 Recent Developments

Is continued globalization inevitable? When being asked about the development of globalization, Tony Blair – former Prime Minister of the United Kingdom (Gallagher, 2024) – responded with the following statement

I hear people say we have to stop and debate globalisation. You might as well debate whether autumn should follow summer (Tooze, 2018)

Blair’s statement relates to a phenomenon that is commonly referred to as Hyperglobalization. It is described as an extreme and accelerated form of globalization which started a few decades ago (Subramanian et al., 2013, p. 4). Since the second half of the last century, exports have risen sharply. As seen in Figure 1, from 1970 until the late 2000’s, the exports of goods and services as part of the worlds GDP increased by nearly 20 percentage points.

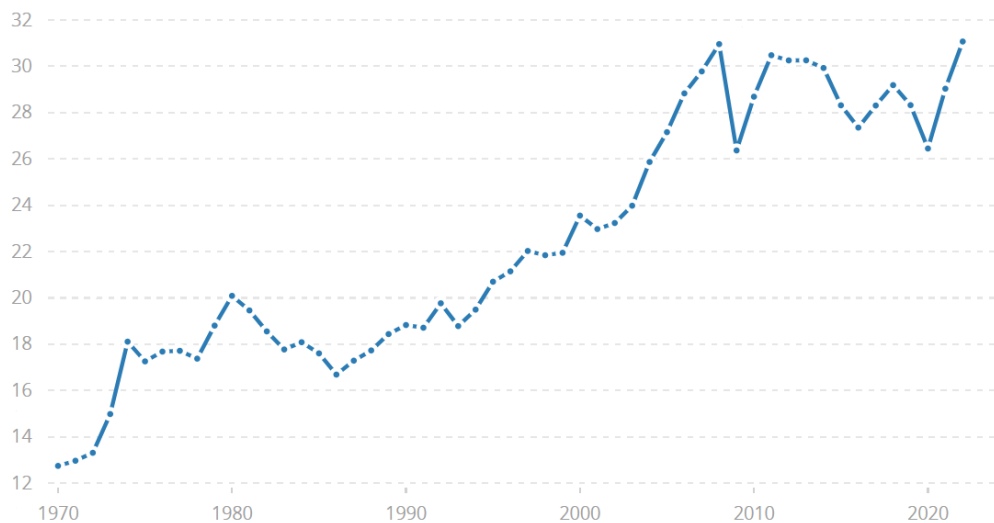


Figure 1. Economic Hyperglobalization comes to a halt during the 2000's
Exports of goods and services (% of GDP)(The World Bank Group, 2022)

However, Hyperglobalization is only the first of two opposing Megatrends that shape the economic landscape in the future. The other trend being Regionalization – also known as deglobalization, slowbalization, and localization (O’Neil, 2023). It describes the shift from a global approach to one which is more focused on regional and national production. Causes for this are diverse. What stands out however, are global crises and economic disruptions (DeAngelis, 2024).

Another look at Figure 1 shows that – beginning in the 2000’s – the export of goods and services came to a halt. Moreso, distinct valleys are visible such as in 2009. This valley is the result of “the collapse in international trade” (Levchenko et al., 2009, p. 1) during the 2008 financial crisis. Additionally, Figure 1 shows a more recent recession in April 2020 – two months after the Invasion of Ukraine by the Russian army (Ray, 2024). The war created supply chain disruptions and rising inflation rates, which in return fuelled deglobalization (Rogoff, 2022).

As can be seen from the previous paragraph, it is debatable whether Tony Blair is right with his analogy. However, he made his statement in 2005 (Tooze, 2018) – before the financial crisis and long before the Russo-Ukrainian-War. Blair chose the seasons as an analogy for the consistency of globalization. Naturally, Autumn will follow Summer no matter the circumstances. Nevertheless – and as evidenced by Figure 1 – global circumstances indeed have an impact on globalization. Crises can directly impact the economic climate on a global scale. Consequently, would therefore not be climate the appropriate comparison?

1.2 Problem and Need for Action

The economic climate in recent years has been influenced by several disruptions and crises (Engström, 2023, p. 289) – some of which like the 2008 financial crisis make a clear dent in the economic progression. And to be more precise, crises and disruptions influence the resilience of supply chains (Fan et al., 2023). Machinery producing companies in particular experience major price fluctuations in recent years. Interviewee 1 from the ENGINEERING ASSOCIATION identifies two phenomena as decisive: **First**, the COVID-19 pandemic which began in early 2020. Far-reaching restrictions in public life had clear side effects on the global economy (Dyvik, 2024a). Consequently, machine producing companies suffered a decrease in sales (ibid.). According to Interviewee 1, more than half of German machinery producers experienced a decline in sales of 10 % to 30 % (personal communication, 3 April 2024). **Second**, the Russo-Ukrainian-War. Interviewee 1 thereby cites an article by the OECD, that “the war in Ukraine triggered [...] severe disruptions to global markets for critical raw materials” (Moisé, 2022). Economic sanctions on Russia affect the market. Rising prices and levels of inflation lead to weakened supply chains and heavy cost pressure (Iselin, 2024). As of 2024, the geopolitical instability is a threat to supply chain stability (Freeman, 2024).

As described in chapter 1.1, global crises have an enormous impact on the world economy. Their impact also reflects in the price development of certain goods. For machinery producers in particular, the price trend for steel is especially important. Figure 2 visualises the prices for hot-rolled steel over the past 20 years in different economic areas. Noticeable are – again – clear marks in the years 2008 and from 2020 onwards. Interviewee 1 attributes this to the 2008 financial crisis

and to the three phenomena described above (ibid.). What stands out is the price development in each region after 2020. Prices for steel begin to skyrocket – especially in the United States. Likewise, prices in Western Europe increase significantly. However, prices in China and India experience only minor fluctuations when compared to the US and Western Europe.

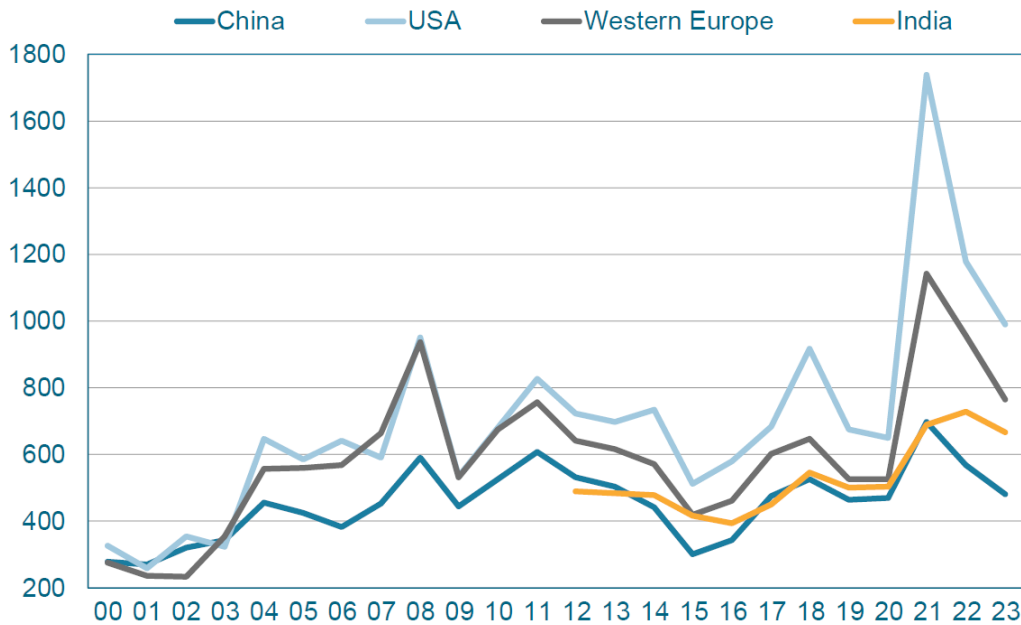


Figure 2. Steel prices rapidly increase after 2020 in USA and Western Europe

Steel Prices, Hot Rolled Coil in US-\$ per Metric Ton (Interviewee 1, 2024, p. 1)

Steel is an essential material for machinery production. Moreso, manufacturers rely on price stability for smooth production cycles (González et al., 2011, p. 1). Among producers, special machinery manufacturers occupy a special position: They have low output volumes – thus limited bargaining power for procurement – and often are tied to a specific sector. This is the case for German based special machinery producer *BAUER Maschinen GmbH* – short: BMA. The company specialised in the production of machinery for complex construction projects. When compared to its competition – such as Liebherr and Caterpillar – BMA has a moderate output volume and is linked to the construction sector. This dependency, combined with reduced bargaining power, makes the company vulnerable to supply chain disruptions. Extreme increases and fluctuations in steel prices can pose a threat to profitability. As a result of the above, *BAUER Maschinen GmbH* is confronted with three distinct problems: First, handling rising cost pressure, Second, managing supply chain stability while simultaneously (third) securing its position in the market for special construction machinery. Sourcing steel parts is a vital part of BMA's value chain. Since, the Chinese market shows resilience to steel price fluctuations, it is important to assess whether sourcing in this country is a viable option for the future.

1.3 Objective

Bauer Maschinen GmbH faces a number of challenges. In order to defend a competitive market position, the company needs a future-proof and resilient sourcing strategy for its steel parts. As mentioned in the previous paragraph, China appears to be a solid contender for sourcing. Steel prices in China appear to be significantly lower than those of local competitors in Germany and Eastern Europe. However, adjusting the sourcing strategy is a major undertaking. Not only do companies buy over long distances, but they also have to deal with the circumstances in other countries such as ongoing tensions between China and Taiwan – adding additional risk to the undertaking. Thereby, BMA identifies a research gap within strategic sourcing.

The objective of this thesis is therefore to recommend a course of action for BMA's sourcing strategy. China might be a suitable country for expanding the company's own sourcing network. In order to achieve this goal, this thesis will analyse the **Strengths** and **Weaknesses** of a special machinery manufacturer as well as the **Opportunities** and **Threats** of the Chinese sourcing market. The result of this will be a strategic recommendation. Special machinery manufacturers are hereby illustrated by the example of BAUER Maschinen GmbH in Germany. The research is issued in the form of a university thesis for the Master in Economics and Business Administration, specialising in Industrial Management. The researcher is therefore employed by the company with the aim of closing the research gap. Participants in the research therefore include colleagues, superiors and the company's business partners.

1.4 Chosen Method

The objective of this thesis falls into the category of strategic management. In order to make a sound strategic decision, a suitable methodology is required. The *Strategy-Formulation Analytical Framework* (SFAF) by Fred R. David is a proven technique to develop business strategies (Suntanto et al., 2023, p. 45). David recommends using the framework to help companies “identify, evaluate and select strategies” (2011, p. 176). It is therefore applicable to the research objective stated above. SFAF incorporates sub-methods into a three-stage analysis framework. First, the *Input Stage*: Its objective is to provide information for the next two parts. Second, the *Matching Stage* relies on “information derived from the input stage to match external opportunities and threats with internal strengths and weaknesses” (David, 2011, p. 177). As the previous sentence suggests, a SWOT analysis will be the centre of stage two, which results in different strategic alternatives. Third and last is the *Decision Stage*. Taking input from both stage one and two, its aim is to “[objectively decide] among alternative strategies” (ibid., p. 192). The methodology in its entirety will be described in chapter 4.1 (p. 24).

1.5 Structure of the thesis

In order to create a general understanding of the framework, **chapter 2** first introduces the case company BAUER Maschinen GmbH as well as highlighting the overall company structure and core business processes. The main theme of this thesis is sourcing. Therefore, the general procurement process at BMA will be described in more detail. **Chapter 3** consists of a literature review. In order to solve the research problem, the research first needs a theoretical foundation. The literature review explores the development and objectives of the Chinese economic system. In addition to that, economic principles of *Strategic Business Development* are covered. Before being applied, the core methodology of this thesis will be described in **chapter 4**. This includes the specifics a Mixed-Method approach, the means of data collection as well as the SFAF-Method developed by Fred R. David.

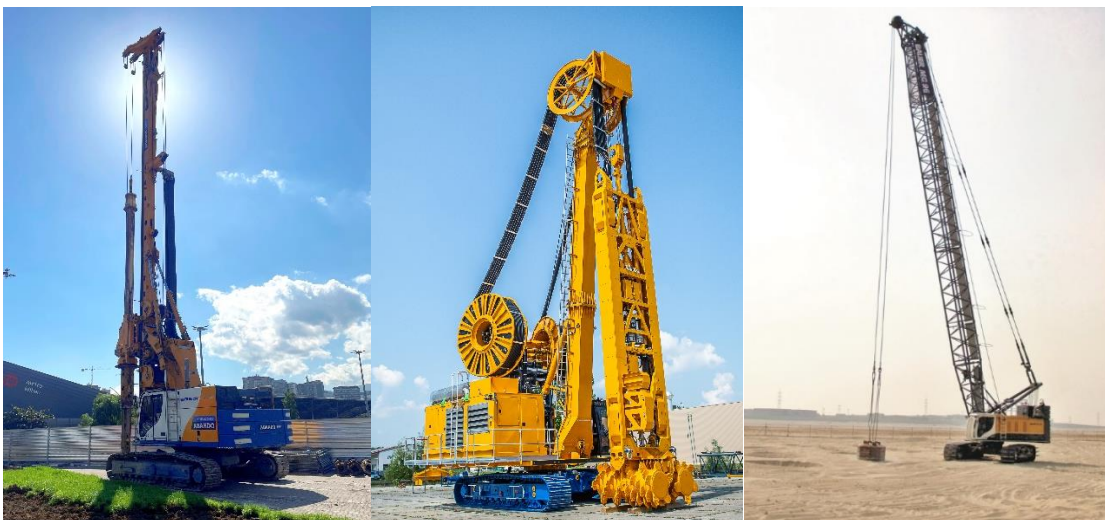
Chapter 5 consists of part one of the Input Stage. First the external perspective is presented. Its contents are derived from the sourcing market China. In contrast, **chapter 6** focuses on the internal perspective: Highlighting the situation as a special machinery manufacturer. The contents of both perspectives are applied and discussed in the following three chapters. **Chapter 7** – the Matching Stage – defines Strengths, Weaknesses, Opportunities and Threats. This SWOT-Analysis serves as the basis for different sourcing strategies. **Chapter 8** uses a Multicriteria Decision Making Analysis (MCDA) to identify the best solution. After that, in **chapter 9**, the chosen solution is translated into a recommendation for action – thereby closing the main part of the thesis. Lastly, **chapter 10** concludes the document with a short summary, an evaluation and an outlook on the future.

2 Prerequisites

2.1 Introduction to the company

The Bauer Group is a construction and mechanical engineering company based in Schrobenhausen, Germany. The core business of Bauer Group is the production of complex excavations, foundations and vertical sealing, as well as the development and production of machines for this purpose. In 2022, the companies of Bauer Group had a total group turnover of 1.5 billion euros (Bauer Group, 2022, p. 1) with around 11,000 employees (ibid, p. 8). The Bauer Group consists of the listed company Bauer AG, Bauer Spezialtiefbau GmbH, Bauer Maschinen GmbH and Bauer Resources GmbH (ibid., p. 13).

Bauer Maschinen GmbH has been operating independently on the market within the Bauer Group since 2001 (ibid, p. 26). Together with its subsidiaries, Bauer Maschinen GmbH designs and builds the entire portfolio of equipment for specialised civil engineering as well as for the exploration, development and extraction of natural resources. The equipment on offer includes rotary drilling rigs, duty cycle crawler cranes, and trench cutter systems. BMA can be categorised as a special-purpose machine manufacturer. The products largely comprise small series production for the special requirements of civil engineering. However, the range extends from customised adaptations to series products to completely newly developed machines. Picture 1 shows three products from BMA with the highest sales figures: The BG series of drilling rigs, used for specialist foundation projects; the BC series of cutting systems; used to cut trenches in hard subsoil; and MC Series of duty-cycle cranes, used as base carriers for different applications.



Picture 1. Bauer Products left to right: Drilling Rig BG28, Trench Cutter BC35, Crane MC96 (Bauer Group, 2024a)

BAUER Maschinen GmbH itself maintains a large number of sales and production locations across the world – 64 sales locations and 9 production locations to be precise (Bauer Group, 2024b). The production site in China is of particular importance for this work. It is a 100% subsidiary of BMA (Bauer Group, 2024c). Bauer started its business activities in Asia during the late 20th century. “In 1991 Bauer opened its first office in Beijing, China” (Bauer Group, 2024d). The production facility in Tianjin, China was started in 2008 (Bauer Group, 2022, p. 9)¹ and since then designs and builds BAUER machinery for the East-Asian market.

2.2 Definition of terms

Relevant terms used in this work are described in more detail below. Terms whose meaning in the corporate environment of Bauer Maschinen GmbH differs from the usual meaning are also included. The title-giving expression of this work is **sourcing**. The term is to be equated with “procurement” and “purchasing”. Sourcing in the sense of this thesis is responsible for covering the needs of production. Non-production requirements (e.g. office supplies) are therefore not relevant. In general, sourcing requirements arise from parts lists.

The **parts list** – also known to as bill of materials – contains the product structure with the associated components and their respective quantities. More precisely, these are Position Number, Material Number, Product Group, quantity and unit of measure, and the Operation Number within the production route. Every product at BMA is assigned a corresponding parts list in the SAP Database. In addition, parts lists can be made up of several subgroups – which also have their own parts lists.

Each product consists of various sub-items, the so-called **assemblies** (in German: “Baugruppen”). A drilling rig, for example, consists of assemblies such as an undercarriage, uppercarriage and mast. These in turn can also consist of their own assemblies. The product structure can therefore branch out considerably. At the lowest level are the raw materials, purchased parts and standardised parts. A **Material Number** is a SAP specific term used to exactly identify one part of a product. Materials, in the sense of SAP, can either be raw materials, semi-finished products, assemblies, but also whole final products.

The title of this thesis mentions **China** specifically. The name China however is a colloquial form of the *People’s Republic of China* (PRC). From this point onwards, the name China is mentioned used when referring to PRC. Southeast of China lies **Taiwan** – an island nation officially called

¹ The Annual Report 2022 is the latest publication of the BAUER Group. At the end of 2023, BAUER Group was victim of a cyber-attack (Bauer Group, 2023). The 2023 Annual Report will therefore be published with considerable delay. The 2024 financial year has not yet been completed. Consequently, an annual report for 2024 is not yet available.

the *Republic of China* (ROC). In a similar way, the name Taiwan is used when referring to ROC. As can be seen above, the official names of both countries are alike. To avoid confusion and to secure readability, the colloquial forms are used in this thesis.

2.3 Core Business Process

The main business processes of Bauer Maschinen GmbH revolve around the design, manufacturing and distribution of machinery for deep foundation construction projects. The machines are designed by the company's own engineers. As mentioned in chapter 2.1, BMA owns multiple production facilities. There, production is carried out by various workshops – the assembly shops (in German “Werkstätten”) (Bauer Employee 2, personal communication, 25 h 2024). In addition to the joining of components using screws and machine elements, the main work content also includes the installation of electrical and hydraulic components. Components are procured by the purchasing department based on the production needs (ibid.)

BMA’s business processes are supported by the ERP (Enterprise Resource Planning) software SAP ERP – hereafter referred to as only SAP. The software is the main product of German software manufacturer SAP SE and is used to efficiently manage the individual areas of a company. At BMA and its subsidiaries, SAP is used in the areas of production, work preparation, warehousing, quality assurance, accounting, sales, human resources, and purchasing – in other words – throughout almost the entire company structure. BMA employees access SAP functions via SAP GUI (Graphical User Interface). Furthermore, data from SAP can be exported and analysed. BMA does with the help of two pieces of software: First, the native software SAP Analytics Cloud (SAC) and second, the third-party software PowerBI from Microsoft.

2.4 Subject of Consideration and limitation

The title of this paper limits the topic to the economic area China. As explained in chapter 1.2 (p. 9), there is an increased need for research in this country. Figure 2 also shows promising cost-saving potential in Indian markets. However, the analysis of both countries exceeds the scope of a Master's thesis. Additional research potential for India is therefore pointed out in chapter 10.3 (p. 71), at the end of this paper. Furthermore, sourcing is only considered for local needs, also known as inbound demand. Together with its subsidiaries, Bauer Maschinen GmbH comprises a large number of different locations. In the context of this study, only the sourcing in China for the production sites in Germany is considered. Sourcing for other BMA production sites (outbound demand), such as Kuala Lumpur, Malaysia or Conroe, USA, is therefore excluded from the analysis.

This thesis is limited to a strategic view of the topic. The operational purchasing process does not change as a result of the relocation of sourcing activities – and is therefore only theoretically relevant for this paper. Additionally, various product groups are used in the production of construction machinery. This includes, for example, steel, hydraulic, electrical and plastic parts - but also normed parts and operating materials. As illustrated by figure 2, steel prices experienced huge fluctuations in recent years. In addition, steel parts are the main components of machines produced by BMA. In order to keep within the scope of a Master's thesis, only steel parts are considered. Again, chapter 10.3 refers to further research potential for other types of parts.

3 Literature Review

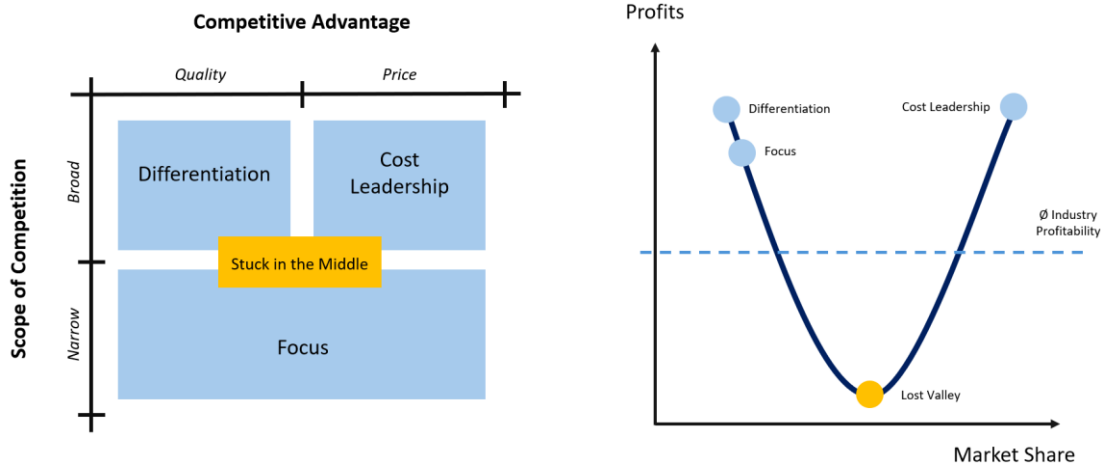
3.1 Methodology and Procedure

Various concepts and phenomena are relevant to this work. In order to gain a better understanding for the following analysis, a theoretical basis is required. Changes happen quickly – especially within a business environment. In the same way, “knowledge production within the field of business research is accelerating” (Snyder, 2019, p.1). Consequently, the literature review aims at providing a state-of-the-art view on the thesis’ most important concepts. First, the review is concerned about the general development of China and specifically its economy. Second, and as mentioned in chapter 1.4 (p. 11), general sourcing decisions fall under the category of strategic management. Consequently, in the second part, the most important aspects of Strategic Business Development are covered. These include the importance of market positioning, competitive industry forces, Megatrends such as sustainability, and the strategic decision of expanding internationally. Chapter 3.3 concludes the literature review by providing a theoretical summary.

3.2 Strategic Business Development

3.2.1 Market Positioning

Former Harvard Business School professor E. Porter “is a leading authority on competitive strategy” (Argyres, 2002, p. 43) and is regarded as “a giant in the field of business” (Roger, 2024). Additionally, his works made “major lasting contributions to strategy” (Stonehouse et al., 2007, p. 256). One work in particular contains useful information for strategic business development. In *Competitive Strategy* (1980 p. 35), Porter describes three generic strategies for “outperforming other firms in an industry”: *Cost Leadership*, *Differentiation* and *Focus*. These differ in terms of scope and the type of competitive advantage. Picture 3 (left side) shows Porter’s matrix for generic strategies. In order to achieve Cost Leadership, a company needs to offer best-price products to a broad target group (ibid., p. 36). Second, Differentiation is achieved by taking quality leadership in the industry. Products need to be “perceived industrywide as being unique” (ibid., p. 37). Lastly, a company can also focus on a particular segment only (ibid., p. 38). This strategy can still yield high returns as long as the company is able to serve its narrow target group really well (ibid.). According to Porter, all three generic strategies are viable options for successful market positioning. However, he reinforces that a company needs to have “total commitment” to **one** strategy in order to remain profitable (ibid., p. 35).



Picture 2. Choose one of three positions. In between leads to low profitability.

Design: Ferdinand Xaver Sebastian Urban (cf. Porter, 1980, p. 39; Porter, 1980, p. 43)

Consequently, a company that is unable to “develop its strategy in at least one of the three directions” (ibid., p. 41) is likely to achieve only below average profits or is not profitable at all – it is “stuck in the middle” (ibid.). Those companies do not have the required capital and market share to compete with low-cost giants; they lack unique and differentiated products to facilitate a low-cost-high-margin position; or they lack the focus to serve a particular target group well enough (ibid., p. 42). Porter illustrates his claim by imagining “a U-shaped relationship between profitability and market share” (ibid., p. 43). Companies on either end of the curve are able to achieve above average profitability, while those who are *stuck in the middle* fall into a valley of low returns. Picture 3 (right side) portrays the U-shaped relationship. Companies that do not fully commit fall into the *lost valley* of low profitability.

While the U-shaped relationship holds true for most situations (ibid., p. 44), Porter admits that there is “no single relationship between profitability and market share” (ibid.). Nevertheless, the U-shape qualitatively demonstrates that an *in between solution* likely leads to an undesirable position. Furthermore, the valley comparison illustrates the effort and investment required to get out of the valley and into a profitable decision. Critics also point to companies that operate successfully on the market in a stuck-in-the-middle-position (Datta, 2010, p. 39). However, as these are mostly exceptions (they differentiate in something else than product, e.g. differentiating the entire portfolio [Nagaraj, 2020]), there is a general consensus that Porter's three strategies can be used to achieve successful market positioning (Allen et al., 2007, p. 9).

3.2.2 Competitive Forces within Industries

In essence the job of the strategist is to understand and cope with competition
(Porter, 2008, p. 25)

Competition however is not only defined by directly competing companies. In fact, “four other competitive forces” (ibid.) shape the “competitive interaction within an industry” (ibid.). The aforementioned E. Porter is regarded as the originator of several pioneering strategic models (Stonehouse et al., 2007, p. 256). He is also the founder of the industry structure analysis named after him – more commonly known as *Porter's Five Forces* Model. As the name suggests, Porter describes five influences of varying importance that affect companies within a particular industry (Porter, 2008, p. 26). According to Porter, in order to understand competition in its entirety, the structure of an industry must be analysed in all five dimensions (ibid., p. 26). He adds that “the configuration of the five forces differs by industry” (ibid., p. 27). To narrow it down, Porter’s Five Forces are illustrated via the machine producing industry. The forces are the following:

First, the *Threat of new Entrants* (ibid.). This shows how easy or difficult it is for new competitors to enter the industry (ibid., p. 28). New entrants might have the desire to acquire market share in a specific industry. How likely it is for new companies to enter the market depends “on the barriers [presented] and the reaction from existing competitors” (ibid.). An industry with high barriers and a high likelihood of retaliation becomes less attractive to newcomers. As a result, the threat of new entrants is less severe. An industry with low barriers and non-existing retaliation on the other hand is more likely to get invaded by new competitors (ibid., p. 29). The entry barriers within the special machinery industry are rather high. Usually, enormous capital requirements and technological expertise are a prerequisite. Existing competitors however have only limited retaliation power, because of the high amount of industry participants (M. Interviewee 3, personal communication, 17 April, 2024).

Second, the *Threat of Substitutes*. A substitute is seen as a product which achieves the same or at least a similar function as an existing product (Porter, 2008, p. 31). The substitute can be either direct or indirect (Ogaki, 1990, p. 1271). For example, the E-mail became a direct substitute for postal letters. On the other hand, indirect substitutes are harder to examine (ibid., p. 1273). A recent example is that during the COVID-19 pandemic, home office work began to substitute office work – and indirectly replaced the daily commute to work by staying in place. Public transportation got therefore indirectly substituted by home office work – at least partially. In the case of the machine producing industry, the threat of direct substitutes is comparatively low – but not neglectable. As a case in point, alternative drive types are gaining large market shares and are – partially – driving the combustion engine out of the market (Manoj, 2022, p. 594; Szumska et al., 2023, p. 38). As for the special machinery industry, an indirect substitute can come in the form of shifted demand. In the case of BMA, a reduced demand for specialised construction projects will reduce the demand for the respective machinery. A substitute can be for example increased

sensitivity to climate change and environmental damage (M. Interviewee 3, personal communication, 17 April, 2024).

Third is the *Bargaining Power of Suppliers* (Porter, 2008, p. 30). “Companies depend on a wide range of different supplier groups for inputs” (ibid.). Powerful suppliers can influence prices, quality, availability and supply conditions (ibid.). Consequently, being situated in an industry where the bargaining power of suppliers is high, controlling the input factors becomes harder. Their power is mainly derived from three factors: If the product is unique, suppliers can exert pressure, since buyers cannot easily switch to someone else. If the number of suppliers is low, the amount of options for a buyer is limited – resulting in higher supplier power. If changing the supplier is bound to high switching costs, customers are less likely to do so (ibid.). Within the special machinery industry, supplier power is moderately high (M. Interviewee 3, personal communication, 17 April, 2024). Nowadays, suppliers are located across the globe – which increases the number of available suppliers. However, the customer base also widened. Suppliers might have the power to choose customers based on their own preferences. In doing so they might prefer regular over special machine manufacturers due to them having higher purchasing volumes (ibid.). Fourth, the *Bargaining Power of Customers* (Porter, 2008, p. 30). Buyers – similar to suppliers – have the power to demand lower prices, quality standards and business terms. The company takes now the role of the supplier while the same mechanics as above apply – only flipped (ibid.). If the number of buyers is low, few large customers can exert high pressure. If the offered product is standardized and not differentiated enough, buyers might easily switch to another supplier. Low switching costs allow customers to be selective and picky. Special Machine manufacturers have the advantage of offering highly differentiated products (M. Interviewee 3, personal communication, 17 April, 2024). In the case of construction machinery, the buyer base is rather large as big construction projects happen in many environments.

Lastly and fifth, the *Rivalry Among Existing Competitors* (Porter, 2008, p. 32). Existing participants in an industry exert pressure on each other. The intensity of competition is influenced by many factors – many of which are similar to the ones listed above such as the amount of differentiated products on offer (ibid.). Low differentiation leads to increased price competition. Moreover, a heightened number of competitors also increases the competition as more and more companies fight over market share and customer bases (ibid.). Intense rivalry usually lowers the overall profitability of an industry. As a result, companies need to develop strategies to manage competition (ibid., p. 33). Special machine manufacturers fight over profitability due to the increasing number of competitors in recent years (M. Interviewee 3, personal communication, 15 h, 2024). Far East machinery manufacturers have a competitive advantage since labour costs are usually lower in East Asia (Dyvik, 2024b; McEvoy, 2023).

3.2.3 Emerging Megatrend Sustainability

“Climate change represents the greatest risk to the well-being of the world” (Antaki, 2023). The World Economic Forum defines it as the most influential Megatrend of the present day – “outstripping all others” (ibid). Environmental sustainability gains ever greater influence in the decision making process (de Jager, 2022). According to de Jager, business strategies that ignore ESG (Environmental Sustainability Goals) are associated with “higher risks, lower competitive advantage and lower business opportunities” (2022). This claim is supported by various sources (Dietz, 2022, p. 120; Dufva et al., 2023, p. 9; Engel et al., 2023, p. 4; Lubin et al., 2010). Nevertheless, the question arises as to the motivation of companies to deal with sustainability.

No business wants a reputation as being a polluter. A bad sustainability record will hurt the firm in the market, jeopardize its standing in the community, and invite scrutiny by regulators, investors, and environmentalists. Governments increasingly require businesses to behave responsibly and require, for example, that businesses publicly report the pollutants and wastes their facilities produce (David, 2011, p. 317)

David hereby provides a concise and precise description of the influence of sustainability on corporate strategy. Furthermore, the author states that a company needs to incorporate sustainable practices as a “permanent part of doing business” (David, 2011, p. 320) – hence he lists six important reasons for doing so: **First**, “consumer demand for environmentally safe products” (ibid) is increasing. Reichheld et al. (2023) are expecting a “major shift in consumption patterns, where truly sustainable brands [...] will seize the advantage”. **Second**, the general public demands that business processes “preserve the natural environment” (David, 2011, p. 320). Pressure is exerted on companies through people changing their minds. Kolcava et al. (2022, p.1) state that the “sustainable governance of international supply chains are likely to be acceptable to the public” – non-compliance, on the other hand, tends to be rejected. **Third**, environmental advocacy groups have increasing membership numbers; about 20 Million now just in the United States (David, 2011, p. 320). Biglan (2009, p. 215) states that they will increase pressure on companies for the “unsustainability of [their] manufacturing processes”. This acts as counterweight “to effective lobbying by the business community” (ibid).

Fourth, “Federal and state environmental regulations are changing rapidly and becoming more complex” (David, 2011, p. 320). The Organisation for Economic Co-operation and Development (OECD) annually publishes the Environmental Policy Stringency Index (EPSI) of its member states (OECD, 2024). Overall, all nations have increased their stringency to sustainably policies. Moreover, Ou Yang (2020) argues that while policy adherence might harm the economy at

first, “in the long term, the opposite is true”. **Fifth**, “consumers, suppliers, distributors and investors shun doing business with environmentally weak firms” (David, 2011, p. 320). Villena et al. (2018, p. 65), argue that multinational companies seek to engage with their suppliers in sustainable initiatives. Sustainable practices will therefore benefit the customer-supplier relationship. **Sixth**, David (2011, p. 320) describes that firms will face “liability suits and fines” for non-compliance with environmental policies. As a case in point, the Corporate Sustainability Reporting Directive (CSRD) requires companies to disclose information regarding environmental issues (Hummel, 2024). Non-compliance would be punished by the legal systems of their respective governments (ibid).

3.2.4 International Expansion and Supply Chain Resilience

Multinational Corporations (MNC) – also known as International Firms – are organizations that conduct business not only in domestic markets, but also across borders (David, 2011, p. 331). David (ibid.) argues that “the strategic-management process is the same for multinational firms” and domestic ones. However, the process itself “is more complex for international firms due to more variables and relationships” (ibid, p. 332). David argues that, as foreign business activities increase, the amount of additional administrative work and complexity does not just scale in a linear way. It is rather a steepening curve. As international business activities grow, complexity increases rapidly. The amount of “social, cultural, environmental, political, legal and competitive” (ibid.) factors to bear in mind have significant impact on the strategy implementation. Amongst other risks, David mentions “currency losses through exchange rate fluctuations, [...] social/political disturbances, import/export restrictions, [...] and trade barriers” (ibid.). At the same time, and due to globalization, the competitive forces (cf. chapter 3.2.2, p. 18) grow. In the case of special machine manufacturers: new competitors enter the industry to fight over market shares **and** the bargaining power of customers and suppliers rises as more and more business partners become available (B. Interviewee 1, personal communication, 29 April, 2024). Globalization fuels competitiveness. David therefore concludes that “before entering international markets, firms should [...] conduct extensive research to diminish the risk of doing business in new markets” (ibid.). As a method of hedging, he recommends – among other things – entering into partnerships and strategic agreements (ibid., p. 333). His recommendation is backed up by other experts as well (Capik et al., 2017, p. 50; Kennedy et al., 2009, p. 259; Išoraitė, 2009, p. 42). Chapter 1.2 demonstrates the fragility of economic systems during global crises. Figure 1 (p. 8) shows clear dips following the occurrence of events such as the 2008 Financial Crisis. The United Nations Development Programme claims that “we live in a world of worry” (Conceição, 2022, p. 5). As a case in point, they list “the Covid-19 pandemic and the war in Ukraine” (ibid., p. 3) as

prime examples for growing global uncertainty. Furthermore, price fluctuations – not only in steel parts – become more and more severe (Xu et al., 2022). This state of extended insecurity is now known under the term *Permacrisis* (Antaki, 2023). As a result, the “complexities of crises force supply chain managers to formulate crisis-induced strategies” (Durugbo et al., 2022, p. 1). According to Durugbo et al., supply chains are not instantly disrupted by a crisis. Rather, the procedure contains three distinct phases: a pre-crisis, intra-crisis, and post-crisis period. Each phase has a different approach to gain resilience. First, in the pre-crisis period, the supply-chain needs to be *prepared* for events. Second, shortly after the incident a supply-chain *response* is necessary as a coping mechanism (intra-crisis). And lastly, during the post-crisis period, the supply-chain needs *recovery* and *restoration* (ibid., p. 5). Naturally, crises often cannot be foreseen. Preparation for an incident is a long-term process. Managing supply chain resilience is therefore not a list item that can be ticked off, but rather an ongoing process.

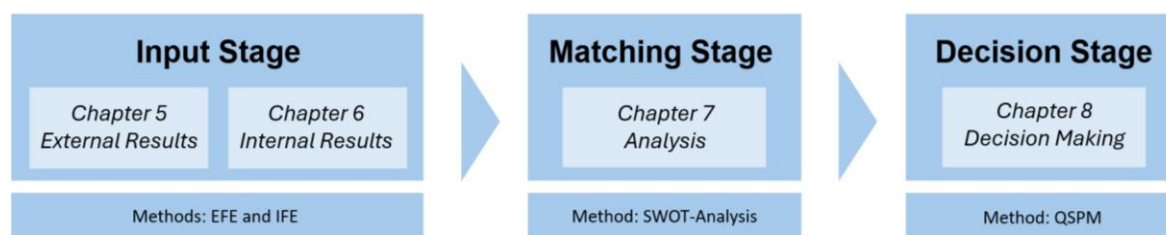
3.3 Theoretical Summary

E. Porter is considered the father of numerous strategy models. His two works in particular *Competitive Strategy* and *The Five Competitive Forces That Shape Strategy* were and still are widely used. The first of which states that a company needs to commit to a specific strategy in order to stay profitable. Porter mentions three strategies a company can choose to adopt: Cost Leadership, Differentiation, and Focus. Without committing to one of those strategies, profitability plummets down and a company becomes *stuck in the middle*. In his second work, Porter shows that competition goes beyond direct rivalry. In fact, there are a total of five forces that affect companies: the threat of new entrants and substitutes, the bargaining power of suppliers and customers as well as industry rivalry itself. In addition to the above, sustainability becomes increasingly impactful as companies fear to be labelled as a polluter. Not only that, but governments begin to tighten the thumbscrews. As a result, companies must fulfil increased requirements of their business partners and government. This holds true of MNC’s that need to please not only domestic customers and authorities, but also international ones. As globalization continues the beforementioned forces intensify. Strategic partnerships are therefore recommended to mitigate the risks of internationalisation. Moreover, and to strengthen supply chains, ongoing processes should secure resilience before, during **and** after a crisis occurs.

4 Methodology

4.1 Strategy Formulation Analytical Framework

The research problem of this thesis is located on a strategical level. At the strategic management level, it is not particularly economic to evaluate all possible alternatives – since “there are an infinite number of possible actions” (David, 2011, p. 175). Consequently, David recommends to identify “a manageable set of the most attractive alternative strategies” (ibid.). He therefore developed a methodology for use in Strategic Business Development. The *Strategy-Formulation Analytical Framework* is a “process of generating and selecting strategies” (ibid., p. 175) via a three-stage model. Each stage – and its place within this thesis – is visualised in picture 4 below. All three stages occur in sequential order. Also, each stage is assigned a corresponding sub-process – or, as in the case of stage 1, two sub-processes that complement each other. The following paragraphs explain every stage in greater detail.



Picture 3. The following chapters are tied to a stage of SFAF

Design: Ferdinand Xaver Sebastian Urban (cf. David, 2011, p. 177)

The first stage – also known as the *Input Stage* – is concerned with providing the right information for both later stages. The input-tools required are the External Factor Evaluation (EFE) as well as the Internal Factor Evaluation (IFE). As the names suggest, EFE is concerned about outside, environmental information, while IFE deals with internal, company-specific aspects (ibid, p. 59). External audits – also referred to as environmental scanning or industry analysis – “focuses on identifying and evaluating trends beyond the control of a single firm” (ibid, p. 60). Environmental factors are therefore independent of the case company. However, in order to make EFE and IFE complementary, external factors need to be evaluated from the perspective of special machinery manufacturers. Internal audits on the other hand focus “on identifying and evaluating a firm’s strengths and weaknesses.

Second is the *Matching Stage*. Its objective is to provide good strategic alternatives for a later decision. David (2011, p. 177) defines good strategy as “the match an organization makes between its internal resources and skills and the opportunities and risks created by external forces”.

Similarly, the research objective (p. 11) mentions four terms (highlighted in bold letters): Strengths, Weaknesses, Opportunities, and Threats – also called Risks. As the names suggest, an in-depth SWOT-Analysis will be the core-method for the matching stage. According to Ferreira (2020, p. 98), the “SWOT analysis has a long history and has been extensively studied”. An extended explanation is therefore omitted. However, the following aspects should be taken into account: the analysis “consists of four areas into two dimensions” (Gürel, 2017, p. 995): internal and external. Strengths and Weaknesses provide an perspective into the company’s *internal* factors while Opportunities and Threats are attributes of the *outside* sourcing market in China. Consequently, it takes the results of EFE for external and IFE for internal analysis. According to Interviewee 8 and Praveena (2023, p. 774), the SWOT- Analysis is a suitable tool for “strategic planning in organizations”. Moreso, it can be used to “build organizational and competitive [strategies]” (ibid.). By combining inside and outside elements, the SWOT-Matrix defines four types of strategies: SO (Strengths-Opportunities), WO (Weakness-Opportunities), ST (Strengths-Threats), and WT (Weakness-Threats).

Strategic decisions should not be made on the basis of gut feeling and intuition. It takes a decision-making method with a well-founded basis. The last of the three stages therefore selects the most promising alternative from the ones developed in stage 2. A Multicriteria Decision Analysis (MCDA) is preferred as it “allows strategic planners to evaluate alternative strategies objectively based on previously identified external and internal [...] factors” (Kho et al., 2021, p. 85). Being a variation of MCDA, David (2011, p. 192) recommends the Quantitative Strategic Planning Matrix (QSPM). This method uses input from stage 1 and matching results from stage 2 “to decide objectively among alternative strategies” (David, 2011, p. 192). The QPSM Matrix is divided into two dimensions: First, the strategic alternatives and second, the evaluation criteria. The criteria consist of “information obtained directly from the EFE Matrix and IFE Matrix (David, 2011, p. 192). The special feature of a Multicriteria Decision Analysis is that evaluation criteria are weighted. Each criteria is thereby multiplied by a factor determining its importance. Every alternative then receives a numerical value that indicates its attractiveness. Multiplied with the respective weight and summed up, a score determines the total attractiveness of each strategy. This concludes the three-stage method by David.

4.2 Mixed-Method Approach

The use of exclusively qualitative **or** quantitative methods appears to be insufficient in the context of this work (M. Interviewee 3, personal communication, 17 April, 2024). Using only quantitative methods may lead to subjective decisions that lack the necessary foundation. Moreso, quantitative methods alone are missing the strategic view that is hard to visualize with just

data (David, 2011, p. 177). A mixed-method approach (MMR) is therefore chosen as the framework of this research. The “essential characteristic [...] of mixed-method research is [the] usage of quantitative **and** qualitative methodology” (Matović et al., 2021, p. 1).

As mentioned in chapter 2.3 (p. 15), nearly all business processes at BMA are supported by the ERP System SAP. The system stores an enormous amount of company data. In addition to that, Bauer Maschinen GmbH has thousands of employees spread across multiple locations. The experiences and opinions of BMA employees are a valuable source of information for this work. As a case in point, company information exists in both quantitative and qualitative form. Consequently, MMA “combine[s] the rich, subjective insights [...] from qualitative data, with the standardized, generalizable data generated through quantitative research” (Regnault et al., 2018). The objective is to “use quantitative and qualitative approaches” to get “a better understanding of [the] research problem [...] than either approach alone (Molina-Azorin, 2016, p. 37). In order to achieve this, a triangulated MMA design is chosen. With triangulation, both qualitative and quantitative complement each other for a well-founded interpretation (Kelle, 2019, p. 11). This means that factors of both EFE and IFE rely on qualitative **and** quantitative data. Nevertheless, not all findings can be equally supported by both types of data. In some situations, qualitative claims cannot be reliably supported by data. The overarching criterion is to maintain triangulation. If no quantitative data is available in a specific case, further qualitative sources have to be consulted.

4.3 Means of Data Collection

As mentioned in chapter 4.1 (p. 24), the three-staged SFAF-design by David (2011, p. 176) consists of an inside and outside perspective. The data collection is therefore also split into two separate categories: *internal* and *external* data. Within each category, data is collected via the triangulated MMA design. This means that qualitative and quantitative data is needed for EFE and IFE respectively. As a result, four general channels/sources for data collection exist: First, **qualitative-internal** data. BMA operates independently since 2001 and has well trained personnel across the firm. The experiences and opinions are collected through semi-structured interviews (SSI) – sometimes referred to as unstructured interview (Zohrabi, 2013, p. 254). Interviewees are allowed to answer questions freely, without restricting the possible answers too much (Kakilla, 2021, p. 3). A triangulated design cross-checks and validates the interview responses with additional data – such as documents from the Corporate Handbook UHB (in German “Unternehmens-handbuch”). Second, is **qualitative-external** data. ENGINEERING ASSOCIATION is “the largest network organization [...] for the machinery and equipment manufacturing industry in Germany and Europe (ENGINEERING ASSOCIATION, 2024a). BMA works closely with ENGINEERING ASSOCIATION to obtain trends, information, data and analyses for the mechanical engineering

industry (W. Employee 5, personal communication, h 15, 2024). Furthermore, ENGINEERING ASSOCIATION operates bureaus in China. The association is therefore a valuable source of information. Similar to above, semi-structured interviews are used for data collection.

Third, **internal-quantitative** data. Company data related to all departments is stored within the SAP Database. As of 2024, BMA uses data from SAP to analyse business activities such as production cycles, material movements, parts lists and quality claims. As explained in chapter 2.3 (p.15), PowerBI or SAP Analytics Cloud are used to visualise SAP Data. For this work, data is either collected through already available reports or directly exported from the SAP Database. Data is accessed via so-called *transactions*. Transactions are functions, used to navigate the SAP program structure (C. Employee 4, personal communication, April 15, 2024).

Fourth and lastly, **external-quantitative** data. As mentioned above, ENGINEERING ASSOCIATION is a valuable source of information. In addition to employing experts in mechanical engineering, ENGINEERING ASSOCIATION also maintains a large database (G. Engineering Association Employee 1, personal communication, April 19, 2024). Access is available only to member companies. It contains “economic information on all aspects of mechanical engineering” (ENGINEERING ASSOCIATION, 2024b). This concludes the means of data collection. However, it should be noted that the four channels may overlap at times. BMA employees may have well-founded opinions on external perspectives. Similarly, statistics from ENGINEERING ASSOCIATION can impact internal views. This is considered acceptable (or even desirable) as long as the principle of triangulation is maintained (Bauer Employee 2, personal communication, 12, 2024).

4.4 Assessing the Quality of Mixed-Method Research

According to Fàbregues and Molina-Azorín (2016, p. 2848), “quality is one of the most debated topics in the recent history of mixed methods research”. Generally speaking, the quality of MMA is dependent on its *validity* and *reliability* (Fàbregues et al., 2016, p. 2859; Ihantola, E. et al., 2011, p. 39; Zohrabi, 2013, p. 254). Zohrabi, reinforces that researchers “need to consider the validity and reliability of their data”. In order to demonstrate the quality of this Master’s Thesis, the research is assessed on the basis of these two criteria. Zohrabi (2013, pp. 258-260) furthermore presents various sub-criteria for both validity and reliability. The penultimate part of this thesis, chapter 10.2 (p. 70), takes every sub-criteria and compares it to the research presented in the following chapters. In addition to validity and reliability, the work should be checked for the correct execution of triangulation. Triangulation is given when both qualitative and quantitative sources are available for a finding. If, as explained above, no quantitative data is available, further qualitative sources must be consulted. Appendix 13 shows which sources were collected for a finding.

5 External Results

5.1 Methodology and Procedure

David's SFAF begins with the input stage. Here the information is presented, which is then used for analysis in chapter 7. Chapter 5 conducts the EFE. As the name suggests, this method addresses the external factors for the following SWOT analysis. The main sources are qualitative interviews with ENGINEERING ASSOCIATION representatives and quantitative statistics from ENGINEERING ASSOCIATION. Interviewees are Interviewee 1 and Interviewee 2. Interviewee 1 works at ENGINEERING ASSOCIATION Statistics department. He is the Economic Analyst responsible for Asia and regularly collects international trade statistics. Interviewee 2 is Director at ENGINEERING ASSOCIATION bureau in China. She is responsible for managing the liaison office between Germany and China. For this reason, she is well informed about general circumstances in China. All ENGINEERING ASSOCIATION statistics mentioned are found in Appendix 9 with the kind permission of ENGINEERING ASSOCIATION. Interview transcripts can be found in Appendices 1 and 2. Chapter 5.6 summarizes the results of the External Factor Evaluation.

5.2 Industrial Development in China

Interviewee 2 emphasises that a particular focus lies on making China technologically independent. The aim is to achieve self-sufficiency particularly in critical sectors. Interviewee 1 concludes, that China – being a developmental state – favours certain industries to achieve overarching objectives.

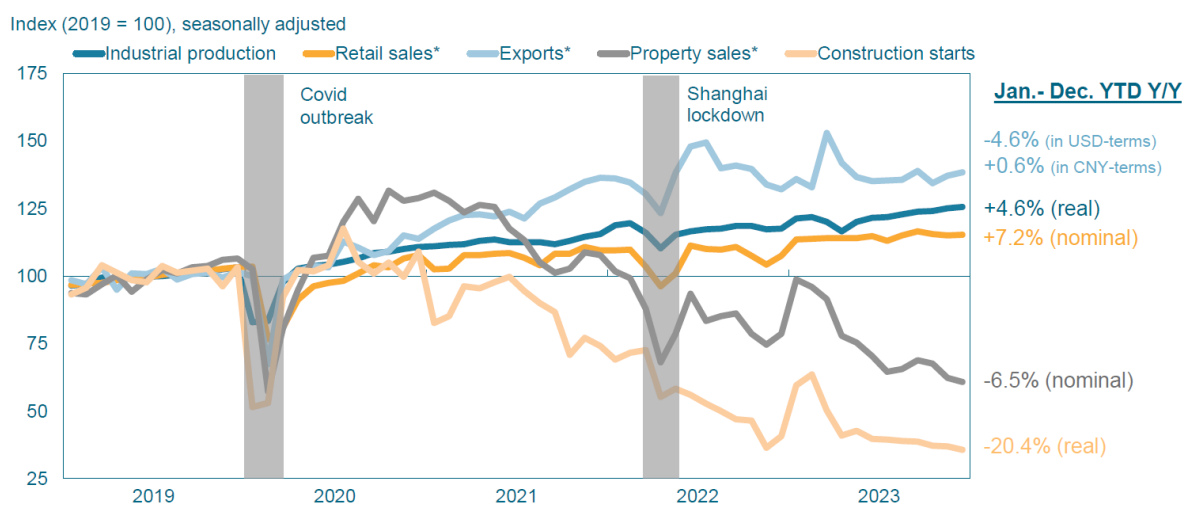


Figure 3. Industrial Production with generally favourable growth - reduction in other areas

Since early 2020, different branches of the Chinese economy underwent contrasting developments. Figure 3 shows that some industries record substantial growth, whereas some fall short. To be precise, Industrial production shows a 4.6% increase in USD-terms. This marks a steady growth over recent years. Furthermore, figure 3 illustrates that construction starts plummet down over 20% each year. Exceptions in both cases are the Covid outbreak followed by the lockdown of Shanghai. Being part of the restrictive *Zero-Covid* policy, the Shanghai lockdown has taken a toll on the economy (Miller et al., 2022). Shanghai is China's financial, semiconductor, electronics and car manufacturing hub and is home to China's largest shipping harbour. Consequently, the city's lockdown resulted in massive financial losses. A significant dip of about 60% happened in construction starts in 2019, indicating stumbling in the real estate sector. The export sector hits a plateau, showing only minimal growth. Interviewee 1 expects a saturated market which limits further expansion. Retail sales however show a 7.6% increase.

Interviewee 1 explains that Industrial Production appears to be more resilient to crises than other industry branches. By taking a look at both the Covid Outbreak in 2020 and the Shanghai Lockdown in 2022, Industrial production takes significantly smaller dips than other branches. In fact, the Shanghai Lockdown is barely noticeable without comparison. Interviewee 1 and Interviewee 2 attribute this to China's agenda to push industrialization. Interviewee 1 refers to the statistics *Expansion of total bank loans, 2013 - 2023 Q3*. From 2015 until 2020 real estate shows promising growth figures. However, after the Covid outbreak, the expansion of loans for real estate decline sharply. In contrast, expansion loans for manufacturing increase dramatically after the Covid outbreak. Markus Engineering Association Employee 1 suggests that the policy attention is increasingly shifting towards a manufacturing economy. Favourable conditions for industrial production would be the result.

5.3 Attractiveness of the Chinese Economy

According to Interviewee 1 and Interviewee 2 at ENGINEERING ASSOCIATION as well as Interviewee 3 and Interviewee 6 at BMA, China has long been a promising destination for foreign investment. However, the above chapter and the literature review show that economic attractiveness is also strongly dependent on the Chinese state. Interviewee 2 argues that cooperation with the mechanical engineering sector is generally favoured. It is however not top the top-priority. The 2024 statistics *Manufacture of machinery, equipment and electrical engineering products* provide additional information. In China, from 2022 to 2023, the real output in the machinery sector showed different growth rates. Special machine manufacturing showed a 3.6% increase whereas general-purpose machinery grew by 2.0%. In contrast, the electrical machinery sector experienced substantial growth at 12.9%.

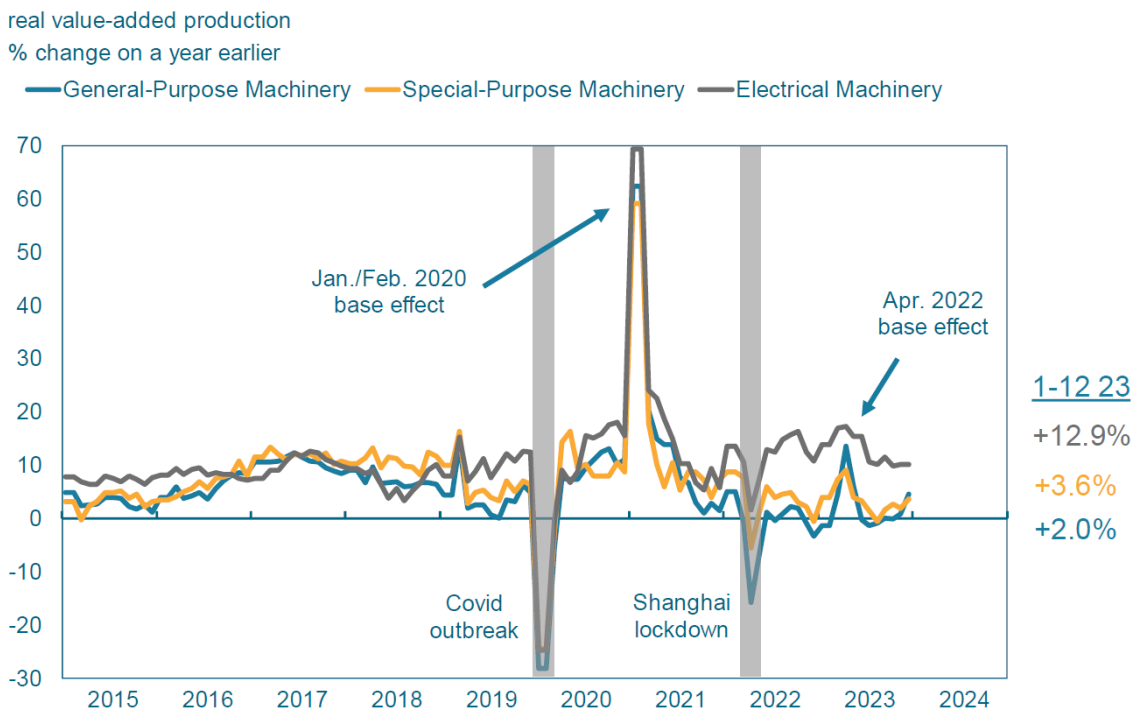


Figure 4. Special-Purpose Machinery with 3.6% growth, but EM takes the lead

Interviewee 1 attributes the difference in growth rates to an electrification trend in the industry. The 2024 *Statistic Investment by selected Industrial Sectors* quantifies this statement. From 2022 to 2023 general investments rose by staggering 32.2% for electrical machinery manufacturers in China. According to Interviewee 1, a significant boost is due to increased demand for batteries, solar panels and semiconductors. Nevertheless, the developments seen in figure 4 show fluctuations in year-to-year growth. Therefore, it is challenging to perceive a precise picture over longer periods. Interviewee 1 attributes this to strong base effects as well as the COVID-19 aftermath. The 2024 *statistic Revenue change broken into volume and price components* is consulted. In the machinery and equipment sector, nominal revenue increased by 1.9% in 2023, while the cost of goods sold rose by 0.7% and profits rose by 6.9%. According to Interviewee 1, the equipment sector is therefore experiencing moderate but steady growth. Conditions are – again – generally favourable. Due to numerous measures to improve the country's infrastructure and technologization – he mentions again BRI – mechanical engineering companies and their suppliers are generally in a good position.

Interviewee 1 goes on to say that commodity prices can provide information about trends and the future situation. The 2024 *statistics Commodity Prices, Producer Price Index and Industrial Profits* compares the Commodity Price Index (CPI) and Producer Price Index (PPI) with the prevailing steel prices. Interviewee 1 explains that PPI is a measure for the average change in selling prices that domestic producers charge for their output. They can be seen as critical indicators for

economic health and also inflation. Figure 5 shows that the domestic steel price follows roughly the development of both CPI and PPI over the last 8 years. Interviewee 1 highlights that the cycle-based behaviour is a recurring phenomenon. It means that fluctuations are a normal economic occurrence. Conclusions should therefore be drawn on the basis of a longer period of time. The data available to the ENGINEERING ASSOCIATION covers around 12 years. He concludes that within this period – on average – the price of steel in China has fallen by just under 3% compared to each previous year. Interviewee 1 cites deflationary pressures as the main reason, which cause prices to fall.

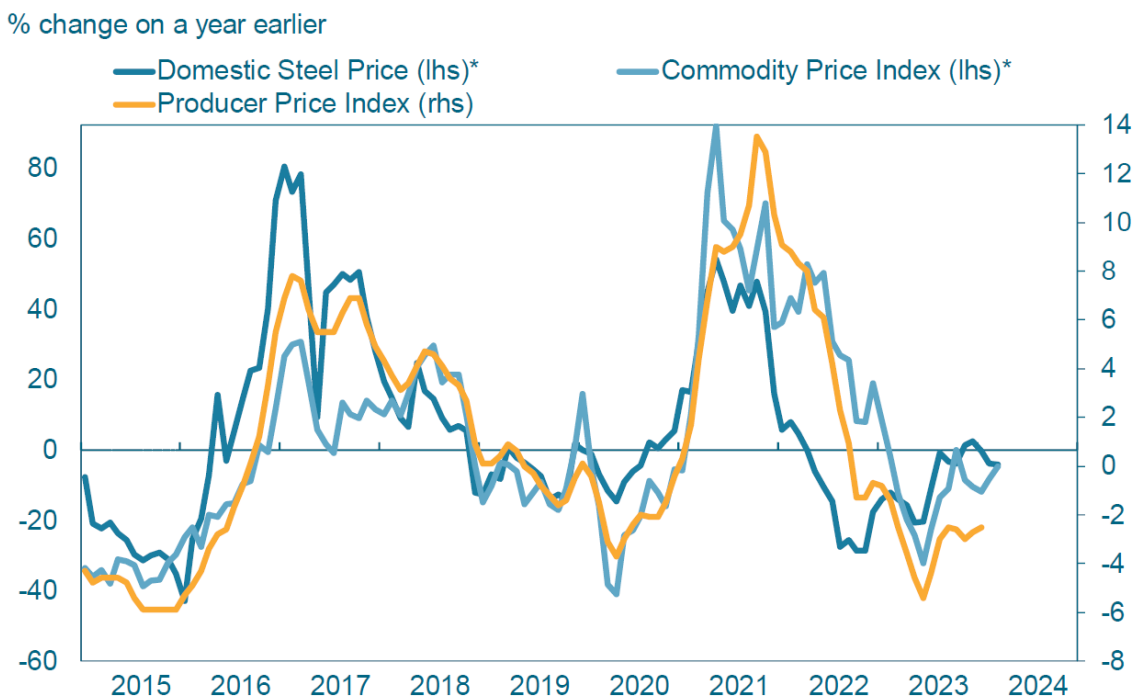


Figure 5. Deflation forces steel prices down. Nearly 3% p.a. on average in recent years

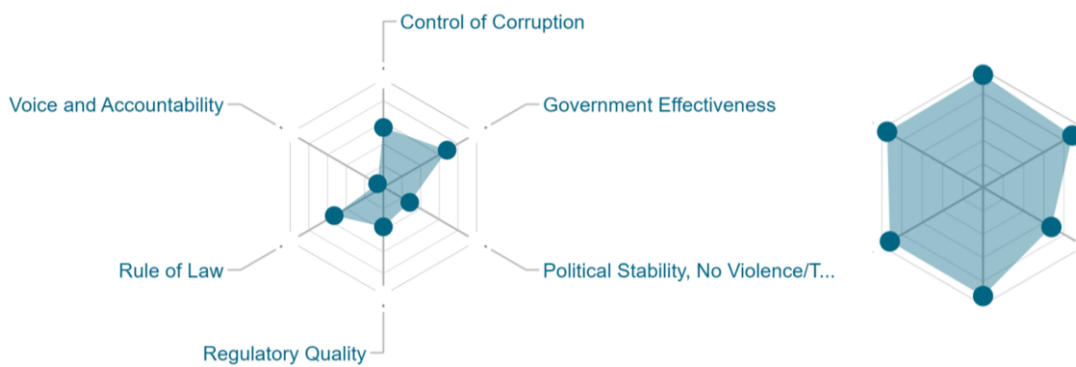
In addition, and as mentioned in chapter 1.2 (p. 9), steel prices in China are subject to significantly less fluctuation than in Europe or the United States. Interviewee 1 adds that this development can present an opportunity for many mechanical engineering companies to reduce costs. He thereby refers to the 2024 study *Forecast Update: Machinery & Equipment Sector in China*. The chart illustrates the price-adjusted change in revenue over the last ten years. In 2019 the revenue increased by 1.9% while producer prices for the machinery and equipment sector decreased by 0.3%. The price-adjusted revenue is shows therefore a 2.2% increase, recovering from a 1.5% decrease in the previous year. The forecast for 2024 is optimistic – showing a 2% growth. Nevertheless, it marks the third consecutive year where revenue grows are significantly below the average of the last decade. Jesek concludes that, developments in steel price, industrial production, and revenue growths suggest generally favourable conditions for foreign business activities.

5.4 Barriers for Doing Business

Similarly, chapter 3.3.4 (p. 22) highlights that business activities abroad are much more complex than domestic ones. Not only that, but as internationalization continues, complexity is amplified. Interviewee 2 notes that internationalisation should be carefully considered and planned. ENGINEERING ASSOCIATION maintains a ranking of various nations for *Ease of Doing Business*. According to the database, overall, China ranks 32nd out of 190 in business friendliness (Rank 1 has the most business friendly regulations of all countries). Germany ranks 22nd. To put it more precisely, it measures the willingness of the regulatory body to authorise business activities and the establishment of new companies. Countries are ranked on the basis of a score, that is made up of various sub-scores. The sub-scores measured include *Trading Across Borders*, *Enforcing Contracts* and *Resolving Insolvency*.

First, Trading Across Borders “records the time and cost associated with the logistical process of exporting and importing goods” (Worldbank Group, 2024a). Here, Germany ranks 42nd with a score of 91.8 whereas China ranks 55th scoring 83,4. However, since BMA does not source abroad when buying in Germany, the usual sourcing countries should be considered instead. Apart from Germany, BMA usually sources steel parts in Eastern Europe (Interviewee 3, personal communication 21 June, 2024). The average score for all Eastern European countries, where BMA has active suppliers, is 97.33. This puts Eastern Europe even ahead of Germany. Czech Republic, Hungary, Poland score a perfect value of 100. Engineering Association Employee 1 – Data Expert at ENGINEERING ASSOCIATION Economics and Statistics – attributes this to an increase of Trade Reforms among Eastern European nations within the last two decades.

Second, Enforcing contracts shows time and cost for resolving commercial disputes with business partners (Worldbank Group, 2024b). Germany is ranks 13th with a score of 74.1. China however achieves a higher score of 80.9 and ranks on 5th place. Third, Resolving Insolvency shows the likelihood of positive outcomes after insolvency proceedings (Worldbank Group, 2024c). Here, the difference between Germany and China shows: Germany ranks on 4th (89.8) whereas China ranks 51st with a score of 62.1. Generally, speaking Germany – or its Eastern European Trading Partners – rank above China in most sub-scores. Only the score for Enforcing Contracts is higher in China.



Picture 4. World Governance Indicators in 2022 for China (left) and Germany (right)

In addition to the above, ENGINEERING ASSOCIATION creates network diagrams for the evaluation of government properties. Picture 5 shows the network for China on the left-hand side and Germany on the right-hand side.

In addition to the above, Interviewee 2 mentions language barriers and cultural differences as typical barriers for trade. ENGINEERING ASSOCIATION does not have data on language proficiency or the extend of cultural differences. Interviewee 2 does however mention her experience with German machine producers that seek business opportunities abroad. She highlights that it is rather easy for Germans begin trade with Eastern European companies since both cultures are rather similar and the spread of English language is comparatively high. Trade between Germans and East Asia however takes this a step further. According to Interviewee 2, cultural differences can be sharp and English language proficiency is not as advanced as it is Europe. Nevertheless she recommends consulting external sources – and, since BMA already has locations in China, checking the experience of BMA employees in China.

Interviewee 6 and Interviewee 4 at BMA agree that English communication in China is still challenging. As a case in point, at the production facility in Tianjin, English language proficiency is not guaranteed. It is more of a trilingual working environment: German, Chinese and English. If two employees do not speak a common language, a translator is called in. According to Interviewee 6 and Interviewee 4, this is not ideal, but a huge improvement to when BAUER Group originally began its business in China. The same applies for Chinese suppliers: English is not guaranteed but gradually improves over time. BMA employees Bauer Employee 2 and Employee 6 agree with these statements. Both have spent considerable time in Tianjin and know the work environment quite well. Bauer Employee 2 and Employee 6 claim that the English proficiency among suppliers increases. Nevertheless, in most cases a translator is and will be necessary in upcoming years (C. Employee 6, M. Bauer Employee 2, personal communication, 28.06.2024). Zhu (2022, p. 2) ranks China among countries with *medium proficiency* in English language. According to Zhu, in Mainland China about 30% of Chinese have major difficulties communicating

in English; about 23% have communication problems; about 35% have minor communication problems; about 10% have no communication problems; and less than 1% speak English close to a native language level (ibid., p. 3). However, the market size for English language trainings in China continuously rises each year (with the exception of the COVID-19 pandemic in 2022) – predicted to be 119,7 billion CYN in 2024 (Textor, 2023). He (2017, p. 572) and Wei et al. (2017, p. 11) expect a continuous development in English language – especially in professional environments. In conclusion, language barriers still present a hurdle for BMA in Chinese working life, although English proficiency slowly rises.

5.5 Monetary Policy and Foreign Investment

David (2011, p. 332) mentions “currency losses through exchange rate fluctuations” in foreign business relations. Interviewee 2 agrees and adds that a company is **always** at a disadvantage when doing business in foreign currencies. A typical trade transaction requires a seller of goods (exporter) and a buyer (importer). Banks and financial institutions facilitate these transactions by financing the trade (Byun, 2023, p. 2). Transactions are thereby linked to an exchange rate given by the financial institution. The exchange rate itself is subject to permanent fluctuations. Additionally, to provide the transaction service, banks take a premium in form of the bid-ask spread (ibid., p. 4).

Chinese Yuan Renminbi is the official currency of the People’s Republic of China (European Central Bank, 2024). The statistics *ECB Euro Reference Rate, monthly average* show the exchange rate development in CNY per EUR over the past decade. Particularly striking is a big drop in 2015, when the Federal Reserve raised US interest rates at the beginning of the year. The CNY became overvalued and investors quickly sold CNY assets. Moreso, global events can shape exchange rate developments. Figure 6 shows a clear decline after 2014 as well as the first quarter of 2020 – the latter marks the beginning of the COVID-19 pandemic.



Figure 6. Chinese Yuan Renminbi per Euro experiences fluctuations over recent years

As it is evident from the graph above, the exchange CYN for EUR is subject to significant fluctuations. From a high of 8.60 CNY/EUR on 30 April 2014 to a low of 6.69 CNY/EUR exactly one year later – a decline of 22% within one year. Later, the currency goes from a second-high of 8.20 CNY/EUR on 31 August 2020 to a second-low of 6.85 CNY/EUR on 31 July 2022 – a decline of 16.46% – before climbing again to 7.95 on 31 July 2023. Machinery producers purchase goods continuously to keep warehousing cycles low (Bauer Employee 1, personal communication, 2 April, 2024). Consequently, sourcing in China means that exchange rate fluctuation CYN/EUR will constantly influence transactions.

Lastly, Interviewee 2 mentions that accessing suppliers in unfamiliar environments is generally more difficult. As demonstrated by Michael E. Porter in chapter 3.3.2 (p. 18), among the competitive forces are the bargaining power of suppliers and customers, the threat of new entrants as well as the rivalry within the industry. Interviewee 1 confirms that this is also true for the special machinery industry. He explains, that, in machine manufacturing, new market entrants fight with already existing participants over market shares – and that special machine manufacturers have comparatively low negotiation power when compared to general machine competitors. Interviewee 2 explains that existing competitors within the industry usually have greater output volumes than BMA. As a case in point, she mentions native Chinese companies Sany and XCMG as well as foreign investors Liebherr and Caterpillar.

In terms of market share, privately owned Sany and state-owned XCMG are the fifth and third largest construction machinery manufacturers in the world – having 5.2% and 5.8% market share respectively (Scholle, 2024). German company Liebherr is with 4.3% market share the seventh biggest and US-American Caterpillar is **the** biggest manufacturer in the world with a staggering 16.3% market share (ibid.). Wacker Neuson – a nearby competitor from Munich – is also listed in the source with a 1% market share (ibid.). BMA however is not amongst the 25 biggest construction machinery manufacturers. According to Interviewee 2 as well as BMA employees

Interviewee 4 and Interviewee 6, this is due to its nature as a special machinery manufacturer. Producing specialised machinery results in a narrow target group. This, in turn, results in lower demand from BMA when purchasing. And as described by Porter, low purchasing volumes reduce the bargaining power as a customer. Suppliers have the freedom to select their suppliers according to purchasing volume. Since larger order volumes are generally favoured, BMA's negotiation power decreases.

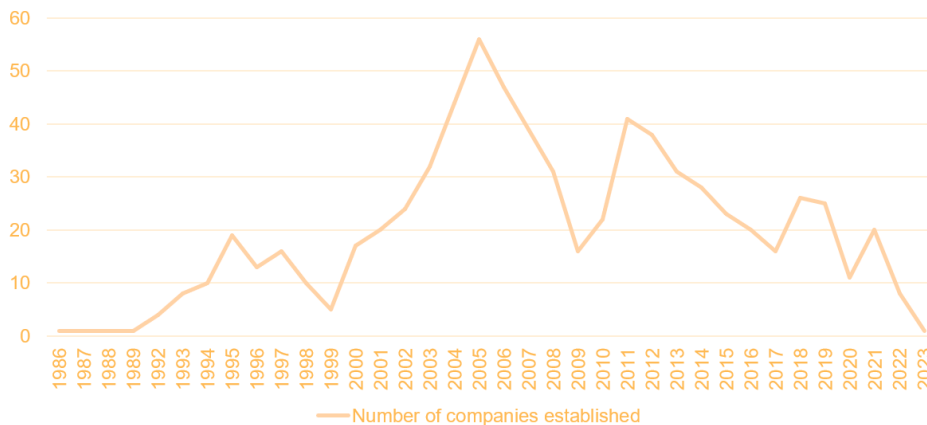


Figure 7. Investment Distribution of legal entities reaches a peak in 2005

Interviewee 2 mentions that in the beginning of the 21st century, many German companies began to establish subsidiaries in China. statistics *Investment Distribution between 1986 and 2023* illustrate this trend. Figure 7 shows that an enormous spike happened during the mid-2000s. The peak of investment was in 2005. A total of 56 legal entities have been established in one year. Another peak was reached in 2011, after the financial crisis, with 41 legal entities. However, after the COVID-19 pandemic, this trend diminished and foreign investment from Germany almost stopped. Nevertheless, Interviewee 2 expects a recovery – even though the past maxima will not be reached in close future. According to Interviewee 2, a similar – less extreme – development happened for subsidiaries of mechanical engineering companies in China in general. The market is largely saturated and foreign companies that want to settle down in China have already done so in the period described above. We can therefore expect increased competition from both domestic and international companies in China in the sourcing market. To summarise, BMA has a comparatively low negotiation power due to low purchasing volumes. The threat of new market entrants is low, but the rivalry within the industry is expected to be rather high.

5.6 Consolidation of EFE

The Input Stage showed generally favourable economic conditions for machine manufacturers in China. Industrial production and specifically special-purpose machinery is growing and appears to be somewhat resilient to recent crises. Nevertheless, business in China means to adhere to the Chinese regulatory and legal framework.

In addition to that, cultural and language barriers present hurdles. English language proficiency is still lacking and a common language is not guaranteed. However, forecasts for English language trainings are promising. Companies are at a disadvantage when doing business in foreign currencies. Exchange rates fluctuate and the monetary policy is determined by the Chinese state. Losses and drastic changes may happen – especially in vulnerable times such as the COVID-19 pandemic.

Table 1. All factors provided by External Factor Evaluation

No.	Category	Short Description
1	Opportunity	Favourable Economic Conditions in China
2	Threat	Issues due to Legal and Regulatory Compliance
3	Threat	Cultural and Language Barriers
4	Threat	Monetary Volatility and Currency Fluctuations
5	Threat	Threat to Supply Chain Stability due to Crises
6	Opportunity	Diversified Supplier Base
7	Opportunity	Possibility of Strategic Partnerships
8	Threat	Access/Maintenance of Supplier Relationships in Foreign Markets
9	Threat	Increased Lead Time

Special machinery manufacturers have to deal with high competitive forces. Low ordering volumes make it harder to access and maintain continuous supplier relationships – especially in foreign markets. Not only that, but sourcing on the other side of the globe results in increased logistical work and lead times. Table 1 shows all key-points from part one of the Input Stage. Chapter 6 continues to address the internal perspective.

6 Internal Results

6.1 Methodology and Procedure

The Input Stage continues with the Internal Factor Evaluation. In contrast to EFE, IFE looks at internal, company-specific factors. The methods of data collection include interviews with BMA employees, the SAP ERP database as well as the corporate handbook. Interviewees are Interviewee 3, Interviewee 4, Interviewee 5, Interviewee 6, and Interviewee 7. Interviewee 3 is well informed about quality issues. Interviewee 4 is a director for the production plant China. He therefore knows about BMA-specific topics in China. Interviewee 5 drafted BMA's sustainability strategy. Consequently, she has expertise in the area of sustainability. Interviewee 6 is a field correspondent for the BMA locations in Asia. He supports the connection from Germany to Asia for BMA. Lastly, Interviewee 8 is the chief buyer at the Tianjin production site. His task is to oversee the operational purchasing business. The interview transcripts can be found in Appendices 3 to 7. Some IFE findings are also categorised as opportunities and threats. However, as the underlying data source is internal to the company, the findings remain part of IFE. As a result, external SWOT-factors also appear in IFE in the summarising chapter. They are marked with an asterisk (*) in the first column.

6.2 Corporate vision and Market Position

As described in chapter 3.3.1 (p. 17), good market positioning is a necessary mean for remaining profitable. Companies that do not choose a clear market strategy are consequently *stuck in the middle*. According to Interviewee 3, BMA has chosen the clear strategy of quality leadership. Interviewee 3 goes on to explain that quality leadership is an integral part of the company's philosophy. It is the basis for BMA's success in the first place. This quality concept does not only include product quality. It also includes – among other things – maintaining high-quality relationships with business partners and upkeeping a high quality image of the company. According to Interviewee 3, there is a direct correlation between quality leadership and corporate success. Strategic changes would therefore only be conceivable while maintaining quality leadership – including a change in the sourcing strategy. Interviewee 3 concludes that the market positioning is indisputable.

For this reason, the corporate quality agenda ce.91.en. was adopted – also known as *BAUER's Triple A*. As the name implies, the guideline consists of three main parts: First, Health Safety and Environment; second, Culture Quality and Ethics; and third, Performance. Moreover, the company commits to the following self-imposed obligations

We increase the quality of our products and services by continuous improvement with the target of zero mistakes; We ensure the long-term economic success of our company by our activities; We strive to achieve full satisfaction of our customers, partners and employees (BAUER Maschinen GmbH, 2019)

In addition to this, the corporate guideline in.71.en.G *Quality policy of the BAUER Group* was adopted in 2019. It explains the main aspects of BAUER's Triple A in more detail. The document is in line with Interviewee 3's statements. Quality is “the basis for the BAUER Group’s worldwide success and it belongs to the fundamental concerns of our company” (BAUER Group, 2019, p. 2). Moreover, the document states that a fundamental asset is “the trust of our customers in our company and in the quality of our products and services [...] and has to be preserved and expanded whenever possible” (ibid.). Both statements cement quality leadership as **the** appropriate market position for BMA.

Porter’s three generic strategies are characterized by their scope of competition: succeeding in either price **or** quality (cf. picture 3, p. 23). Porter recommends fully investing in one strategy to avoid getting *stuck in the middle* (1980, p. 43). Competitors of BMA focusing on price achieve profitability via a low-cost and high-market share strategy (ibid.). Small margins are therefore justified by high sales volumes. The focus on quality on the other hand is characterized by quality-products in smaller market segments. High prices are justified by quality products and services. BMA falls obviously in the latter category. The products are in the upper price segment. According to This difference is mainly due to the high cost structure of BMA products. The majority of the machinery is manufactured in the production plants in Germany. Material and labor costs are comparatively high in Germany (McEvoy, 2023). Competitors in East Asia manufacture for lower prices (Dyvik, 2024a; F. Bauer Employee 3, personal communication, 9 April, 2024).

Chapter 5.5 (p. 34) already showed that BMA is not one of the 25 largest construction machinery manufacturers in the world. Native Chinese companies like Sany and XCMG as well as international companies such as Liebherr and Caterpillar claim way higher market shares. Output volumes of BMA are comparatively small, and, in turn, purchasing volumes are also low. Interviewee 6, Interviewee 4 and Interviewee 3 conclude that BMA’s negotiation power with suppliers is therefore comparatively low as well. The above mentioned companies can request higher amounts of goods and have therefore a competitive advantage. Special machinery manufacturer have much narrower target groups due to diversification. Interviewee 1 at ENGINEERING ASSOCIATION notes that low-cost competitors are also limited by the market. If a competitor produces more cheaply, cost leaders lose their unique selling point. As a result, due to the pressure of maintaining a low-cost structure, they tend source solely based on price: changing suppliers if needed. Interviewee 1 goes on to explain that this offers an opportunity to gain more negotiating

power as a company. BMA's strategy of keeping close supplier relationships could therefore yield a competitive advantage.

6.3 Quality Fluctuations in different Regions

The previous chapter shows that positioning as the quality leader is particularly important for BMA. A relocation of sourcing activities raises the question of whether the expected delivery quality is sufficient. Is the product quality of Chinese suppliers at the same level as German – or European – suppliers? The National Bureau of Statistics of China (2022) points to the ongoing “trend of High-Quality Development”, which is described as one of the leading trends within the Chinese economy. However, as mentioned in chapter **Error! Reference source not found.** (p. **Error! Bookmark not defined.**) governmental organs – such as the bureau of statistics – is subject to the directives of the Chinese Communist Party (CCP). This tarnishes credibility and should be cross-checked by external sources. As a case in point, Interviewee 2 observes a similar development. Catching up with Western quality standards would therefore be a key objective of Chinese economic policy. This claim is supported by Engineering Association Employee 1 According to him, a key policy of the Chinese government is to “pursue High-Quality-Development” (2024). In addition to that, Interviewee 6, Interviewee 4 and Bauer Employee 3 at BMA are convinced that Chinese suppliers are catching up with the local (German) product quality.

Nevertheless – and in the interests of triangulation – these claims should be verified by quantitative sources. Quality management at BMA includes the processing of quality defects. A database object exists in SAP for this purpose – the so-called *Notification* (in German “Meldung”). YI notifications occur when materials get damaged within the company and therefore need to be reworked. This message type is particularly relevant for internal cost accounting and time allocation. YQ notifications on the other hand are the fault of suppliers. Deliveries that do not fulfil the agreed conditions and therefore subject to complaint. As seen in chapter 2.2.4 (p. **Error! Bookmark not defined.**), claim management is the last part of the procurement process at BMA and starts when a faulty delivery is detected by the department for incoming goods (in German “Wareneingang”). Since this paragraph is concerned about the quality standard of suppliers, only YQ notifications matter – YI notifications are omitted.

The Notification object is basically a container for data. It contains all the essential information for processing a claim. The most important factors in this case are the supplier name, date of notification and the severity of the quality defect. Suppliers are described both by their official name and by a supplier number. The supplier number is used internally at BMA and uniquely identifies each supplier. For example, suppliers with several business branches appear under the same name but with different supplier numbers. This division is particularly important if a

supplier has delivery plants in different countries. The country of origin is described by an abbreviation with two characters – for example DE for Germany and CN for China. Lastly, the severity of the quality defect is described by a number which can take one of four possible values: 0.25, 0.5, 1 and 2. First, 0.25 is classified as a *notice* (in German “Hinweis”), a small defect, which usually triggers only minor follow-up work. Second, 0.5 is a *small defect* (in German “Geringer Mangel”), a defect that usually requires reworking but no return. Third, 1 is classified as a significant defect (in German “Erheblicher Mangel”). This defect usually requires considerable reworking and the product may have to be returned. Fourth, 2 describes the most serious possible defect, a *safety defect* (in German “Sicherheitsmangel”). As the name suggests, not only is the product quality inadequate, there is also an acute safety risk. BMA products are designed for foundation construction and develop enormous forces during use. Consequently, safety risks are unacceptable. Notifications are collected in the SAP database. As mentioned in chapter 2.3 (p. 15), BMA uses the software SAC to export, analyse and visualize company data. This also applies to quality notifications. In addition to other analyses, the defect rate (in German “Mängelquote”) is particularly meaningful. The defect rate is the percentage share of notifications in the total of all delivery items. It is usually calculated on a monthly basis. By taking the sum of all individual weights, the weighted defect rate can be calculated.

$$\text{Defect Rate} = \frac{\text{Sum of all notifications}}{\text{Sum of all deliveries}} * 100$$

$$\text{Defect Rate (weighted)} = \frac{\text{Sum of all individual weights}}{\text{Sum of all deliveries}} * 100$$

The defect rate has long been regarded as an indicator of basic supplier quality. However, the reliable database is limited to just over three years. Notifications in the period from 1 January 2021 to 27 May 2024² are therefore used for evaluation. According to Employee 5 – Digitisation Expert Supply Chain Shopfloor at BMA – the selected time period is sufficient for supplier assessment (personal communication, 27 May, 2024). By default, SAC analyses the notification data for all BMA plants. The data is however not sorted according to the supplier's country of origin. Nevertheless, the supplier number can be used to establish a link between the delivery item and the country of origin. The following table shows the defect rates for German, Chinese and Eastern European suppliers in the period mentioned. Due to the cyber-attack in November 2023, no supplier data is available for this month.

² Date of export from the SAP database

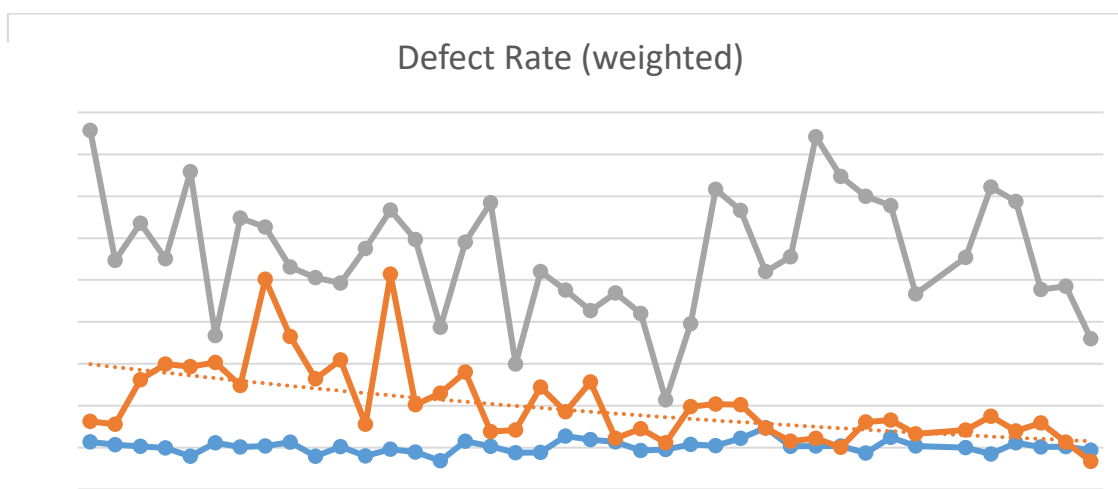


Figure 8. Trend line for Chinese suppliers approaches German level

Starting from the bottom, it is evident, that Germany has the overall smallest defect rate out of all three regions considered. Not only that, but it also shows the lowest fluctuation. The defect rate stabilizes around 0.5. Second is China, with an overall higher defect rate than Germany. Moreover, in the time period between July 2021 and November 2022, the fluctuation in quality defects stands out – reaching a high of 2.56 in January 2022. However, the fluctuation steadily decreases in the following period. From November 2022 onwards, the defect rate stabilizes between 0.5 and 1. What is particularly noticeable, however, is an unusual spike in January 2024 (cf. Appendix 11). According to Yang Qiaoguo – Quality Inspector at the Tianjin production plant – this rash can be attributed to the aforementioned cyber-attack. Due to the incident, many delivery items were not entered into the system (personal communication, 18 June, 2024). Quality deficiencies (in the numerator) therefore lead to an upwardly biased result. In order to arrive at a comparable result, the average number of delivery items is therefore calculated (for the entire period under review). The weighted defect rate for January 2024 is then calculated using this average value. The result is 0.87 and therefore slightly higher than 0.71 in December 2023. Consequently, the value for January 2024 is not out of the ordinary. In order to obtain an undistorted impression, this deflection is replaced by the adjusted value in Figure 9 (the unchanged figure can be found in Appendix 11). Third, are Eastern European countries. BMA already sources steel parts from this region due to lower price options than in Germany. Noticeable here is that the defect rate is consistently higher than in China and Germany. In addition, fluctuation is also much more pronounced than in

the two previous countries. The statistical range amounts to 3.21 – compared to 2.23 for Chinese suppliers and 0.39 for German Suppliers.

In conclusion, figure 9 shows a clear hierarchy of supplier countries: Germany with the overall lowest defect rate out of all three; Eastern European Countries ranking with the highest overall defect rate and fluctuation; and lastly, China ranking in between with slightly higher defect rates than Germany and moderate fluctuation. However, it is worth noting that a positive trend is emerging for Chinese suppliers to BMA. In Figure 9, the orange dotted graph shows a clear trend towards lower defect rates in recent months. It can therefore be concluded that Chinese supplier quality is gradually approaching the quality of German suppliers. Not only that, but the overall quality issues are significantly lower than from Eastern European suppliers. These conclusions are based on the assumption that quality inspectors at all BMA plants have the same views on quality defects. According to Employee 6 – Digital Supply Chain Manager at BMA – company-wide regulations for quality assessment exist. All BMA quality inspectors follow the same inspection criteria (personal communication, 18 June, 2024). It can therefore be assumed that the assumption is correct.

6.4 Influence of Sustainability and the Company Image

As mentioned in chapter 3.2.3 (p. 21), no business wants to be labelled as a polluter. To avoid this categorisation, BMA is trying to meet sustainability requirements. The company has set out the core ideas of the sustainability strategy in its corporate directive in_566_en_BMA-G. The directive was published in April 2024 and is therefore up-to-date. At the very beginning, it is described that the sustainability concept is part of the *BAUER Triple A* quality credo (cf. p. 38). The document describes concepts for the entire company – not all of which are relevant to this work. Therefore, only those parts are considered that have an influence on changed sourcing activities. According to corporate in_566_en_BMA-G, two main legal obligations and regulations apply to BMA in the future: the *Corporate Sustainability Reporting Directive* (CSRD) and the *Carbon Border Adjustment Mechanism* (CBAM). Interviewee 5 describes CSRD and CBAM having the highest impact out of all regulations in the foreseeable future.

CSRD is a regulatory framework aimed at improving the quality, consistency and comparability of sustainability information. Among other things, the CSRD requires companies to report on their sustainability strategies and goals. The directive is primarily aimed at large companies, including Bauer Maschinen GmbH. BMA is therefore obliged to comply with the directive. According to Interviewee 5, Bauer is not yet affected, but is in a transition phase that will last until 2025. After that, compliance is mandatory. The transition phase helps companies to analyse what topics are actually relevant for future reporting. At BMA, this takes place as part of a double materiality

analysis (in German “Doppelte Wesentlichkeitsanalyse”). The European Commission defines Europe-wide standards for a materiality analysis called ESRS (short for “European Sustainability Reporting Standards”). Although the analysis has not yet been finalised at BMA, Interviewee 5 can already name the following ESRS standards as essential: *E1 General requirements* (in German “E1 Allgemeine Anforderungen”), *E2 Environmental Pollution* (in German “Umweltverschmutzung”), *S1 Company Workforce* (in German “Eigene Belegschaft”), and *S2 Labor Force in the Value Chain* (in German “Arbeitskräfte in der Wertschöpfungskette”).

BMA will be obliged to publish standardised reports on all these topics in future. Interviewee 5 emphasises that CSRD only calls for transparency, but does not provide any further rules for action. There are therefore no limits that can be exceeded. What is important here is that stakeholders are given an insight into company processes. A stakeholder analysis identifies customers, shareholders, management, employees and bank/financiers as influential stakeholders. More precise, customers and shareholders are by far the largest stakeholders. Relocating sourcing activities to China would probably increase the company's pollutant emissions. Interviewee 5 argues that CSRD will disclose the transparency of emissions and influences customers. To what extent, however, is uncertain, she says.

CSRD requires standardised reporting, but has no further obligations to act. The situation is different with CBAM. CBAM – short for Carbon Border Adjustment Mechanism – aims to put a price on greenhouse gas emissions for imported goods. Up until now, companies could avoid purchasing CO₂ certificates in Europe by having goods manufactured abroad and then importing them. CBAM tries to equalise these competitive differences. According to Interviewee 5, there is also a reporting obligation, but this only applies to the European Union and is not public. Similarly, there is a transitional period until 2026, after which suppliers must declare their pollutant emissions. At the same time, the buyer is obliged to purchase corresponding certificates. There are no generalised limit values that must be observed. Only the acquisition of certificates must be proven. By 31 May each year, BMA is obliged to submit certificates via the CBAM register in accordance with the report. These can be purchased via a standardised European platform. Similar to securities, these can be traded and therefore do not have a fixed price.

With regard to steel products from China, certificate trading is becoming important. Chinese suppliers would have to prove the emissions of their products. Product and transport emissions must be offset by BMA with certificates. If reports and certificates are submitted correctly, BMA has fulfilled the requirements of the European Commission and does not have to fear any reprisals. If the company does not act in accordance with the requirements, penalties are to be expected. Fines exceed the certificate prices many times over. More serious, however, would be an import ban on

CBAM goods. Purchased products would therefore not pass customs inspection at the border. This would be disastrous for BMA. Accordance to CBAM regulations is therefore essential. In conclusion, CSRD and CBAM complement each other. CSRD is targeted towards stakeholder transparency while CBAM demands transparency towards governmental institutions. Both require BMA to disclose information regarding environmentally harmful corporate activities. Interviewee 5 as well as Interviewee 3 argue that relocating sourcing activities to China increases the product carbon footprint of BMA machinery. Reporting said business activities via CSRD and CBAM could in turn influence stakeholders as well as require more certificates for emission compensation. Increasing the product carbon footprint is contrary to BMA's sustainability strategy. According to Interviewee 5 and Interviewee 3, this should be taken into account during the decision stage of the analysis.

6.5 Supply Chain Maintenance and Logistics

Supply chain management (SCM) is the strategic coordination and balancing of all business functions along the entire supply chain, from the customer to the supplier, in order to improve the performance of the entire supply chain in the long term (BAUER Group, 2024e).

The primary financial objective of supply chain management is to improve the company's results by achieving the best possible balance between requirements, capacities and inventories (ibid.). In short, Supply Chain Management is one of many mechanisms that ensure long-term profitability of the company. Interviewee 4 mentions that Supply Chain Management abroad comes with additional challenges. Bauer grew organically over the last decades within its own country. However, Bauer sought new business opportunities and established subsidiaries abroad. Managing the companies supply chain across the globe is consequently more complex than domestically.

Interviewee 4, Interviewee 6, Bauer Employee 2, and Interviewee 3 at BMA as well as Interviewee 2 at ENGINEERING ASSOCIATION mention additional administrative work for global SCM (personal communication, 16 July, 2024; 18 July 2024). Bauer Employee 2 mentions that the production plant Tianjin – while performing independently – still needs continuous support from BMA in Germany. He continues that expanding the sourcing activities in China would lead to an increase in additional work for administration. As a case in point, Interviewee 3 mentions claim management as to become more complex. Interviewee 2 mentions that accessing and maintaining supplier relationships abroad – especially in China – takes also increased administrative work. In total, the interviewees draw similar conclusions to what was presented in the literature review (p. 22).

Additionally, Interviewee 3 points out the situation as a special machine manufacturer. Being positioned as a high-quality low-volume manufacturer results in a special position. Having high-quality products means to serve a specific target group very well. However, this also results in a comparatively low output volume and market share. As already mentioned in chapter 3.2.2 (p. 18) this results in reduced negotiating power on the market. Competitors such as Liebherr, Caterpillar, XCMG and Sany all have considerable market shares and therefore higher negotiation power with suppliers. As a result, BMA may have a disadvantageous position due to its position in the industry compared to its competitors. In contrast, Interviewee 2 mentions that Bauer benefits from two conditions: First, BMA already has subsidiaries in China, and second, BMA already purchases goods from Chinese suppliers for the production plant in Tianjin and therefore has an existing supplier network. The company therefore does not have to start from scratch. Interviewee 3 adds that BMA focuses on close customer and supplier relationships. It is part of the credo *Bauer Triple A* to “act loyal and responsible towards our partners” and to “achieve full satisfaction of our customers, partners and employees” (Bauer Maschinen GmbH, 2019). Close relationships are therefore tied to the overall position as a quality leader.

Lastly, Interviewee 6 mentions that sourcing across the globe does not only result in additional work, but also in complex logistical operations. Sourcing steel parts in China is carried out via ship transport. According to Interviewee 6 these can take between two weeks and two months from order to delivery – an average of one month is however likely. This will lead to increased lead times compared to purchasing in Europe. According to Interviewee 6 and Bauer Employee 1, this primarily affects warehousing and production planning (personal communication, 23 April, 2024). Specifically, it means an increase in lead time – i.e. the time from the moment a customer makes an enquiry to the moment they receive the product. Production planning favours quickly accessible materials and the security of their arrival. Increasing the time of access and risking the supply chain stability makes smooth production planning harder. The same holds true for warehousing. The resilience of a supply chain is complex and influenced by various factors. Nevertheless, Interviewee 6 and Interviewee 3 state that sourcing abroad is generally more susceptible to disturbances.

6.6 Cost Saving Potential

Bauer Group’s 2022 annual report describes in the chapter *Market Risks* that “we operate in highly competitive and price-sensitive markets, which mainly concerns the region of Asia and China in particular” (2022, p. 44). BMA is aware that competition from the Far East is increasing global cost pressure. Thanks to its market positioning as a quality leader, BMA is able to stay profitable despite having high product prices. Nevertheless, cost pressure is having a lasting effect. As a

result, the company heavily invests in cost-down efforts. One of which can be to source in best-price-countries. Figure 2 (p. 11) shows that steel prices in China should be considerably lower than prices in Europe. BMA does source steel parts in China for the production plant in Tianjin. The price difference between the two regions is unclear however. For this reason, prices from local suppliers should be compared with prices from Chinese suppliers. BMA products have their materials listed in SAP. They belong to the parts list. Consequently, steel parts of each machine can be researched.

Steel parts are of unequal size and weight. So in order to make steel prices comparable, they are usually quoted in price/weight. These are usually €/kg, €/metric ton, USD/metric ton. This master's thesis refers to the steel price in €/kg. However, sorting by price/weight alone is not completely sufficient. Steel components at BMA are characterised by their complexity and the associated processing effort. Also, steel parts from European and Chinese suppliers are not the same. Large, multi-layered components – such as an undercarriage – are naturally more complex than components consisting of just a few parts. One assumption is that the higher the complexity, the higher the price level €/kg. According to Bauer Employee 2, the complexity of an assembly is related to the number of parts (personal communication, 17 h, 2024). More parts lead to increased complexity and therefore more processing work. Whether a linear dependency actually exists will be examined below. For this reason, the following hypotheses are put forward:

N_0 : There is no linear relationship between €/kg and n/kg

N_1 : There is linear relationship between €/kg and n/kg

The assumption is that an increased number of parts (n) also causes an increase in the relative price. Since the price is standardised by weight, this must also be done for the number of parts. The variables to be compared are therefore €/kg and n/kg. A regression analysis is used to check whether a linear dependency exists (Rosenthal, 2017, p. 1). In order to carry out such an analysis, the following list is necessary: Relevant steel components with associated price, weight number of parts, and land of origin. These values are stored in the SAP database and can be called up as required via transactions. Transaction *I* outputs the parts list for a machine. All individual materials are listed with their respective Material number, name and level.

For each machine, there is a total parts list. Each machine consists of various sub-assemblies, like the undercarriage. The undercarriage itself also consists of its own sub-assemblies, such as the left and right track chains. Moreover, each sub-assembly has its own parts list. As a result, the total parts list consists of several branched sub-parts lists. Accordingly, the material list fans out into a kind of tree structure that branches out further with each additional sub-parts list. Parts lists therefore have several stages. Steel components are characterised by the suffix $S+B$. This is an

abbreviation for welding and processing (in German “Schweißen und Bearbeiten”). Accordingly, only materials with this suffix are considered – all others are omitted.

The stage of a material in the total parts list under the category *level* (in German “Stufe”). If a material is part of an assembly, it has a higher level. The undercarriage serves as an illustration: The undercarriage itself is high up in the product hierarchy at level 1. The chains on the left and right are one level below at level 2, whose parts in turn have a level of 3 or higher. The number of sub-items for each S+B assembly can be calculated from this breakdown. The parts list shows the materials used for a BMA product. However, it does not provide any information about the associated prices or weights. This information can be found in the SAP table *Extended material data* (in German “Erweiterte Materialdaten”). The corresponding transaction is 2. Here, the standard price (in German “Standardpreis”) is used.

Lastly, the country of origin of a steel component should be assigned. Unlike many other companies, BMA does not maintain a list of standard suppliers. To reliably assign the country of origin, a standard supplier must be assigned manually. The SAP database stores how often a material was purchased from a supplier via the transaction 3. The supplier with the highest number of orders is hereby defined as the standard supplier. In addition, each supplier is identified by a unique supplier number found via the transaction 4. The address and thus the country of origin of a supplier is also stored there. This procedure makes it possible to assign a standard supplier and a country of origin to a material.

For a holistic view, the majority of all current steel components must be analysed. Steel components can be found in all BMA parts lists. Therefore, at least one parts list of each machine type is analysed. This parts list is representative of the corresponding machine type. This ensures that as many currently relevant steel components as possible are included in the analysis. A list of the machines currently in production can be found in the PowerBI report *S&OP*. According to the report, the following machine types are currently in production: BG28; BG23; BG45; BG15; BG36; BG30; BG 42; BG26; MC96; BC35; GB 80; GB50; MT185. The BG 38 machine type is still in production, but is a discontinued model and, according to Bauer Employee 2, no longer relevant (personal communication, 14 June 2024). The machines in the above-mentioned product lines account for the majority of production.

All of the above is combined into a table. The steel components are listed there with material number, standard price, weight, number of sub-items, standard supplier and country of origin. The above hypotheses can now be tested for the three most important regions of origin (Germany, Eastern Europe and China). For this observation, a regression analysis shows two distinct values: R-squared and the according p-value. A low p-value suggests great statistical significance (Stømme, 2015). The p-values are as follows: $8.77 * 10^{-51}$ for the German, $2.05 * 10^{-33}$ for

the Chinese, and $9.29 \cdot 10^{-12}$ for the Eastern European dataset. Using the usual significance level of 0.05, it is evident that all p-values are lower than that. The null hypothesis must therefore be rejected in each of the three cases. Consequently, there is a linear relationship between the two variables. R-squared, or the coefficient of determination, determines how well a linear model fits the observation (Hamilton et al., 2015). It takes on a value between 0 and 1 – a higher number indicating an increase in correlation (ibid.) The R-squared for German suppliers is 0.9317, for Chinese suppliers 0.8937, and for Eastern European suppliers 0.8513. Being above 0.8, all values indicate a generally strong fit for a linear model (ibid.). To sum it up, the hypothesis H_1 indicates the existence of a relation between both values (p-value) as well as showing a strong linear dependency (R-squared).

This concludes that an increase in complexity indicates an increase in the price per kg of steel components. Generating *lines of best fit* within each scatterplot results in the following linear equations: $y = 5,2946x + 12,3882$ for Germany, $y = 6,0193x + 8,5353$ for China, and lastly, $y = 5,5521x + 10,8113$ for Eastern Europe. Measured by the y-intercept, the basic costs per kg are lowest in China – followed by Eastern Europe and then Germany. This means that the price of low-complexity steel components is significantly lower in China than in Germany. By contrast, the gradient in China is somewhat higher than in Germany and Eastern Europe. According to this, costs rise more sharply with increasing complexity in China than in the other two regions. As complexity increases, China's cost advantage over the usual purchasing regions shrinks. In the lowest quarter by complexity, the average gap between China and Germany is around 17% and between China and Eastern Europe around 12%. In the bottom 10%, the average difference between China and Germany is even around 21%. For China-Eastern Europe it is around 17%. To sum it up, a significant cost advantage in China can be realised above all for components with low complexity.

6.7 Consolidation of IFE

Part two of the Input Stage presents internal company data. Table 2 illustrates all factors found through IFE. To begin with, BMA took quality leadership within the industry of construction equipment. This position is essential to maintain profitability. Part of BMA's quality thought is also to maintain close, high quality relationships with suppliers and customers. However, as opposed to cost leaders, BMA has comparatively low output volumes, and – in turn – also low purchasing volumes. The competitive forces in the industry are high and BMA is left with reduced negotiation power when compared to other participants. Additionally, adhering to a high quality standard takes its toll in the form of an above average cost structure. Moreover, BMA's products are usually positioned in a rather high price segment – which increases cost pressure.

Table 2. All factors provided by Internal Factor Evaluation

No.	Category	Short Description
1	Strength	Positioned as the Quality Leader in the Market
2	Weakness	Product Portfolio in the Upper Price Segment/Above Average Cost Structure
3	Strength	Close Supplier Relationships
4	Weakness	Low Order Volumes/Reduced Negotiation Power
5	Threat*	Product Quality Fluctuations
6	Threat*	Impairment of Sustainability Strategy
7	Strength	Established Production and Distribution Sites in China
8	Strength	Established Supplier Network in China
9	Weakness	Additional administrative Work for Remote Locations
10	Opportunity*	Cost Saving Potential

The relocation of sourcing activities may lead to fluctuations in quality. However, analyses from recent years suggest that supplier quality in Germany and China is converging. In addition, it is possible that parts that are purchased over long distances leave a larger ecological footprint. This could potentially have a negative impact on BMA's sustainability image. It should also be noted that BMA currently benefits from its existing locations in China. Moreso, the production plant in Tianjin also creates a supplier network. These are two major strengths for internationalisation. Nevertheless, it should be noted that international purchasing activities need to be managed – even more so than local ones. Therefore, the administrative workload will increase when relocating. Probably the greatest opportunity, however, presents itself in the form of cost-saving potential. Suppliers in China are significantly below the price level of German competitors for low-complexity steel parts. Now that external and internal factors have been identified, the next step is to evaluate them in the form of a SWOT analysis.

7 Analysis

7.1 Methodology and Procedure

After gathering data in chapters 5 and 6, now – in the decision stage – the SWOT-Analysis is conducted. The analysis is split into two parts. First, the SWOT-factors from EFE and IFE are consolidated into a SWOT-Matrix – showing all Strengths (S) Weaknesses (W), Opportunities (O) and Threats (T). Every factor is assigned a number for clear identification, consisting of the corresponding letter as well as a consecutive number – for example S1 being Strength number one, W2 being Weakness number two. Chapter 7.2 explains all four parts of the SWOT-Analysis and has each factor in parentheses. Second, the SWOT-Matrix leads to four different strategic alternatives for sourcing. Chapter 7.3 compares the relationship between the internal and external perspectives and develops suitable strategies. All strategies are then briefly described in chapter 7.4. An in-depth analysis will only take place after the decision has been made in the following chapter. This chapter is only concerned with identifying and outlining the alternatives. Chapter 7.5 summarizes the findings.

7.2 Strengths, Weaknesses, Opportunities and Threats

The internal perspective is split into two parts: Strengths and Weaknesses. The **Strengths** of BMA are as follows: The company greatly benefits from being positioned as quality leader in the market (S1). This position is characterized by consistently delivering the best-in-class products within the industry of (special) machine manufacturing. This is in line with Porter's generic strategy of quality leadership (cf. p. 17). Furthermore, already having production sites in target countries like China and India gives a solid foundation for foreign sourcing operations (S2). The same is true for the already existing network of suppliers for the production sites in Tianjin (S3). Operations are eased by established relationships and agreements with local suppliers. Bauers business activities in China– which date back to 1991– paved the way for further operations in the future. It is therefore a competitive advantage over other market participants. Being quality leader, the company values close relationships along the value chain. This applies not only to suppliers, but also to the customer base. Due to the - comparatively - low purchasing figures and deliveries, close relationships are considered important. They are therefore also part of the company's quality concept (S4).

Strengths are opposed by internal **Weaknesses**. BMA's products belong to the high price category. However, preserving quality leadership allows the company to maintain a profitable business. BMA's machinery is designed to suit a particular customer group very well. A high price level is

therefore justified by differentiation (cf. chapter 3.3.1 Market Positioning, p. 17). Nonetheless, the production costs of BMA's portfolio is above the industry average (W1) – especially when compared to East Asian competitors. Growing cost pressure has an increasingly negative impact on this weakness. Again, referring to chapter 3.3.1, the positioning as quality leader is usually accompanied by low market share. In order to avoid being *stuck in the middle*, BMA focuses its business on differentiation: High-quality products with specific usability. Output volumes are therefore comparatively low. In turn, BMA's order volumes are also lower those of cost leadership competitors. As mentioned in chapter 3.2.1(p. 18), ordering volumes affect the bargaining power within an industry. Due to low ordering volumes, BMA finds itself with reduced negotiation power (W2). In addition, new extensive sourcing operations also need to be managed. This means increased workload (W3). Despite the existence of production facilities, foreign operations require support from the local purchasing organization.

Strengths	Weaknesses
S1 Positioned as Quality Leader in the Market S2 Established Supplier Network in Asia S3 Established Production and Distribution Facilities for native Support S4 Close Customer/Supplier Relationships overall	W1 Above Average Cost Structure W2 Low Order Volumes/ Reduced Negotiation Power W3 Additional Administrative Work for remote Locations
Opportunities	Threats
O1 Cost Saving Potential in China O2 Favourable Economic Conditions and Trade Policies for foreign Investment O3 Diversified Supplier Base/Wide Range & Availability O4 Possibilities for Partnerships/Strategic Agreements	T1 Geopolitical Threats to Supply Chain Stability T2 Impairment of Sustainability Strategy T3 Increased Lead Time/Logistical Challenges T4 Issues due to Regulatory Compliance T5 Access/Maintenance of Suppliers in foreign Markets T6 Cultural and Language Barriers T7 Monetary Volatility & Currency Fluctuations T8 Product Quality Fluctuations T9 Changed Customer Relationship

Picture 5. Internal Strengths and Weaknesses as well as external Opportunities and Threats

Design: Ferdinand Xaver Sebastian Urban (cf. Kowalik et al., 2017, p. 155)

Similar to before, the external perspective is also split in two parts: Opportunities and Threats. Four **Opportunities** present themselves. There is a growing interest for companies to source in best-cost-countries. Increasing cost pressure is fuelling the behaviour to reduce internal costs.

Machinery products – especially those from BMA – are characterized by a large proportion of steel parts. Cheaper steel components are therefore a cost-cutting factor with high impact. Purchasing steel components in China offers considerable potential for savings (O1). Furthermore, China has generally favourable economic conditions for foreign business relations (O2). As mentioned in chapter **Error! Reference source not found.** (p. **Error! Bookmark not defined.**), the government strives for a more influential position in the global economy. In order to achieve that, some entry barriers for foreign investors are lowered. And since China began to compete globally, new participants enter the market for global trade. This creates the opportunity to diversify the own supplier base as well as giving access to a broader range of business partners (O3). Navigating foreign markets is naturally more difficult than local ones, especially when the own bargaining power is comparatively low. Entering partnerships and strategic agreements with suppliers is an opportunity to strengthen the supply chain as a purchaser with low order volumes (O4).

Lastly, the number of **Threats** is higher than all other SWOT-factors. First of all, entering foreign markets makes the company vulnerable to geopolitical events (T1). Events that may not be predictable and whose consequences are difficult to assess. Past crises – such as the invasion of Ukraine – show that trade embargos and extreme price fluctuations can be the result. Additionally, sourcing in China for the German production means sourcing across half the globe. Logistics and transportation might have a negative influence on BMA's product carbon footprint. The sustainability strategy may get impaired (T2). Another threat is that longer transportation stretches the overall demand planning. Longer lead times make it harder to flexibly organise production and create logistical challenges (T3). BMA is well aware of regulatory frameworks in Germany. However, for business activities in foreign markets other regulations apply (T4). It should be noted that this poses additional workload in order to fully integrate regulatory compliance into the supply chain. Furthermore, even though BMA already has an existing supplier network in Tianjin, it might be challenging to access and maintain Chinese suppliers for the German market (T5). This could possibly be the case due to different cultures and language barriers (T6). Similar to what is stated above, the Bauer Group grew naturally over the last century within its own native environment. Environments as different as East Asia needs to be treated in its own respective way. Likewise, transactions in foreign currencies are always disadvantageous to some degree. As mentioned in chapter 5.5 (p. 34), the international monetary system can be volatile and currency fluctuations are common (T7). This adds additional instability to supply chains. Opening the supplier base means to assess the quality of any given business partner. Quality fluctuations in products can occur when dealing with foreign suppliers (T8). Lastly, BMA's close customer relationships mean that customers may be sensible to changes. When relocating the sourcing activities, customers might question whether the level of product quality is still on par (T9).

7.3 Identification of Strategic Decisions

All four parts of the SWOT-Analysis have the potential to form a strategic opportunity. As a case in point, combining inside and outside perspectives presents four different strategic routes. This results in the following four combinations: Strengths-Opportunities (SO), Weaknesses-Opportunities (WO), Strengths-Threats (ST), and lastly, Weaknesses-Threats (WT). Each strategy has a different perspective on BMA's sourcing plans. During the Matching Stage, all four alternatives are still on an equal footing. The definition is therefore initially non-judgemental. It is assumed that all four alternatives represent a possible solution. An actual evaluation takes place in the following chapter. Kowalik et al. (2017, p. 156) recommend arranging inside and outside perspectives in a matrix and comparing each factor combination pairwise. Table 4 shows the combination of factors. Panels containing *1* show correlation, whereas panels containing *0* show no – or at least neglectable – correlation.

Table 3. Interactions of external and internal factors

Internal → External ↓		Strengths				Weaknesses		
		S1	S2	S3	S4	W1	W2	W3
Opportunities	O1	0	1	1	0	1	0	1
	O2	0	1	1	1	1	1	0
	O3	1	1	1	1	0	1	1
	O4	1	1	1	1	0	1	1
Threats	T1	1	1	1	0	1	0	0
	T2	1	0	0	0	1	0	1
	T3	1	0	1	0	1	0	1
	T4	0	1	1	1	0	0	1
	T5	0	1	1	0	0	1	1
	T6	0	1	1	1	0	1	1
	T7	0	0	0	0	1	0	0
	T8	1	1	0	1	1	1	1
	T9	1	0	0	1	1	0	0

“SO strategies may focus on growth” (Wang, 2007, p. 8). Using the “firm’s internal Strengths to take advantage of external opportunities” (David, 2011, p. 178) results in the strategy of **Expansion**. The company is therefore actively growing its sourcing operations in foreign markets. First of all, the potential for cost savings in China plays an important role in the company’s cost-down efforts. Moreover, BMA already has an extensive network of suppliers for the existing production sites in Tianjin. Favourable economic conditions encourage the development of this network –

strengthening existing connections and diversifying supply chain participants. BMA's tendency to form close supplier relationships correlates with forming strategic agreements and partnerships with existing suppliers. Intensifying relationships ties into the quality leadership of BMA – quality business processes through diverse (O3) and intense (O4) business partnerships.

Improving the internal weaknesses by taking advantage of external opportunities is part of the **Catch-Up** strategy (WO). BMA identified opportunities in the external environment but – at the same time – has “organizational weaknesses which prevent [it] from taking advantage of [the market]” (Wehrich, 1999, p. 11). BMA's products have above average costs. This is a major disadvantage within the competition. As a result, the company may take advantage of *OI Cost Saving Potential in China*. It does also affect the administrative work remote operations. However, favourable economic conditions may lead to easier foreign investments and would compensate the reduced negotiating power due to low order volumes – as well as helping with additional expenditures for administrative work. Similarly, opening the company to foreign sourcing markets – and strengthening supplier relationships – counterbalances the low negotiation power of special machinery manufacturers.

Third, ST strategies are characterized by using the internal strengths to actively counter environmental threats (Kowalik, 2017, p. 154). Playing defensively while simultaneously using strengths for performance yields the **Safeguarding** strategy. It focuses on protecting the supply chain from risks and securing reliability. *T1 Geopolitical Threats to Supply Chain Stability* poses a risk to foreign sourcing activities – especially with BMA's quality leadership at risk. Support by native BAUER locations in China may help with supply chain problems in the future. The same holds true for T3, T4, T5, and T6. BMA's remote locations can assist for logistical challenges, regulatory issues, accessing suppliers in foreign markets as well as overcoming cultural and language barriers. Currency fluctuations shall be countered by maintaining a stable quality leadership rather than quick market penetration. Similarly, positioning as quality leader leads to meticulous quality control. Possible quality fluctuations from foreign markets may be mitigated.

Lastly, choosing the **Avoidance** strategy means to deliberately avoid the procurement process in foreign markets. TW strategies are derived from actively eliminating threats and counteracting the company's weaknesses. It is characterized by extremely defensive behaviour (Kowalik, 2017, p. 161). Geopolitical risks may lead to supply chain disruptions and affect the already high cost structure of BMA. *T3 Logistical Challenges/Increased Leadtime* also negatively impacts the cost-down strategy. Low negotiation power paired with additional administrative work is impaired by compliance issues, cultural and language barriers, and monetary volatility. As a result, BMA might want to avoid operations in foreign environments – playing a defensive strategy instead.

7.4 Development of Strategic Decisions

The previous chapter identified each alternative by pairwise comparison of internal and external factors. Now every alternative is briefly described. To be precise, each alternative is characterized by several main aspects. First, **Expansion** is the most open alternative for sourcing relocation. Expanding the business relationships and increasing the volume of imports. It begins with a comprehensive analysis of the Chinese steel market, including for example supplier capabilities and market trends. Then the company should focus on establishing relationships in the Chinese market – taking advantage of the existing supplier network. Generally, the internationalisation strategy is to be developed in this case. The expansion of sourcing activities must be woven into the general sourcing strategy. Lastly, by expanding the companies delivery routes, a necessary infrastructure should pave the way for smooth transactions.

Second, **Catch-Up** is the second most open alternative, sitting between Expansion and Safeguarding. The objective is to enhance the sourcing capabilities in China to match competitors as well as closing gaps in the current supply chain. Eliminating the companies weaknesses improves the process of sourcing. Furthermore, BMA should make a benchmark analysis to identify industry best practices. This includes to analyse and compare the current sourcing strategy with those of competitors that already successfully source from China. Furthermore, Catch-Up suggests a planned cost reduction over time. Reduce costs without compromising on quality or performance. The focus lies on cost efficiency with innovation and agility in mind.

Table 4. Each alternative has several main aspects to focus on

Expansion	Catch-Up	Safeguarding	Avoidance
Market Analysis	Process and Sourcing Improvement/Sup. Dev.	Gradual and cautious Expansion (Suppl. Div.)	Developing Risk Avoidance Strategy
International Supplier Development	Benchmark Analysis	Development of Contingency Plan	Ethical and Sustainable Sourcing
Development of Internationalisation Strategy	Cost Reduction Plan over time	Strategic Agreements and Partnerships	Strengthen Local Supplier Relationships
Investment in Infrastructure	Focus on Innovation and Agility	Focus on Strategy, Compliance and Monitoring	Focus on Quality Control and Financial Stability

Third, is **Safeguarding**. It does not avoid sourcing in China, but rather takes a secure approach – safely expanding the sourcing activities. The objective is to gradually and cautiously expand by simultaneously securing the supply chain against risks and disruptions. This includes the diversification of suppliers to hedge risk. A core theme is the development of a contingency plan. It is used to address potential or unexpected events – outlining specific procedures to mitigate the

impact of disruptions. This includes the development of strategic agreements and partnerships with suppliers for critical parts. The supply chain is at risk if critical supply is impaired. Moreover, and for more security, additional emphasis should be placed on alignment with strategy, compliance with regulatory issues.

Lastly, comes **Avoidance**. The objective is to minimize or eliminate the reliance on sourcing steel parts from China – mostly due to high risks or other strategic considerations. However, it should not be seen as a denomination. Shopping in China can still take place. However, only in small purchasing volumes and for non-critical parts. A reorientation of the purchasing strategy is therefore not necessary. Avoidance includes the development of a risk-avoidance strategy: identifying critical parts and securing a safe purchasing route. Non-critical parts have more freedom. Since, a sustainable image gains more importance, more emphasis should be placed on ethical and sustainable sourcing. Also, since international sourcing is basically avoided, resources can be invested in strengthening local supplier relationships. Rather than focusing on internationalisation, the company focuses on regionalisation.

7.5 Consolidation of Results

The Input Stage provides the information to craft a SWOT-Analysis. All four parts of the SWOT-Analysis are arranged in a two-by-two matrix – consisting of an inside (Strengths, Weaknesses) and outside (Opportunities, Threats) perspective. BMA's strengths lie in its strong positioning as a quality leader within the industry. Additionally, the company has a major advantage thanks to its existing production sites and supply structures in East Asia. In contrast, BMA's weaknesses can be attributed to its status as a special machinery manufacturer. The manufacturing of highly specialised machinery results in a portfolio with rather high cost structures surrounding it. Likewise, output volumes are rather low. The same applies to purchasing volumes from suppliers. This results in comparatively low negotiation power. The outside perspective shows that strong opportunities lie in the Chinese sourcing market. Promising is the potential for cost savings and generally favourable economic conditions. Moreover, the supply chain can be expanded by intensifying relationships with foreign suppliers. Nevertheless, the foreign sourcing market harbours a number of dangers. The supply chain stability is threatened by geopolitical risks, regulatory issues and logistical challenges, supplier access. Moreover, cultural barriers, currency and quality fluctuations further complicate operations.



Picture 6. The combination of SWOT-criteria leads to four strategic alternatives

Design: Ferdinand Xaver Sebastian Urban (cf. David, 2011, pp. 179; Skinner, 2012, p. e163; Wehrich, 1999, p. 11)

The two-by-two matrix design suggests a combination of SWOT factors. Combining inside and outside factors leads to four strategic alternatives. Image 4 illustrates all four combinations. Using Strengths to take advantage of Opportunities leads to the Expansion (SO) strategy – a strategy of actively growing the sourcing operations in China. By attenuating Weaknesses to use Opportunities results in the Catch-Up (WO) Strategy. Catch-Up means that a company works to overcome its deficiencies to enhance its competitiveness. Using Strengths to eliminate Threats yields the Safeguarding (ST) strategy. By adopting this sourcing strategy, the company tries to create a resilient supply chain – that is capable of withstanding disruptions. Lastly, minimizing both internal weaknesses and external threats leads to Avoidance (WT). It means to deliberately avoid further sourcing operations in foreign markets. After identifying strategic alternatives, the best one is to be determined. The following chapter evaluates and the chooses the best solution.

8 Decision Making

8.1 Methodology and Procedure

Chapter 7 presented four strategic alternatives. The objective of the Decision Stage is now to determine the most promising. It is divided into three steps – beginning with defining the decision criteria. In order to make a well-founded decision, suitable criteria are necessary. SWOT-factors are therefore translated into decision criteria. Second, weighting the criteria. Since not all criteria are equally important, they must be assigned an individual weight. The weight is measured as a percentage value. Summing up all the weights results in 100%. Third, the actual decision making process is executed. All strategic alternatives are assigned a value for each criterion – measuring the positive impact on the company. The *10-point scale* has proven to be a practical and sensible evaluation scale (Coelho et al., 2007, p. 313). With a score of 1-3 points, the criterion is considered to have only weak influence. 4-7 points indicate a moderate to medium influence. For a very strong influence, 8-10 points are awarded. 0 indicates no influence at all. The entire decision-making process is carried out in collaboration with Bauer Employee 2 and Interviewee 3.

8.2 Definition of Decision Criteria

The Input stage provided multiple factors for each of the four SWOT-perspectives. However, they cannot be used just like that as criteria in the decision making process. Factors – such as S1 *Positioned as Quality Leader in the Market*, or T6 *Cultural and Language barriers* – are only statements. They simply provide information about the strengths, weaknesses, opportunities and threats – as is the nature of a SWOT Analysis. To obtain criteria for evaluation, the factors must be translated into suitable decision criteria. Several factors in the SWOT analysis can define a single criterion. As a case in point, S2 *Established Supplier Network in Asia* as well as T1 *Threats to supply chain stability due to crisis* both affect the resilience of the overall supply chain. In addition to that, S2 does also influence supplier relationships. As a result, SWOT-factors can be part of more than one criterion. However, each criterion must be represented at least once. Table 5 shows how the different factors translate into decision criteria. The following paragraphs highlight the most influential aspects. Corresponding SWOT factors are noted in parentheses.

The first criteria focuses on the *Influence on Strategic Alignment and Market Position*. To begin with, being positioned as the quality leader within the industry is a clear strategic choice. The company rapidly grew in the past century and positioned itself with high-quality, specific-use products (S1). This is also evidenced by BMA's close relationships to suppliers and customers. It is part of the quality strategy to have close bonds with all business partners (S4). Moreover,

sustainability is also part of the overall business strategy. As mentioned in chapter 3.2.3 (p.21), environmental practices are nowadays part of a company's commitment to quality – and therefore part of the positioning as the leader in such (T2). Naturally, *T8 Product Quality Fluctuations* influences the position as well. Fluctuations in quality go against the quality commitment. Also, customers might react to the relocation of sourcing activities (T9).

Table 5. SWOT-factors are translated into decision criteria for evaluation

SWOT factors	No.	Decision Criteria
<i>S1, S4, T2, T8, T9</i>	1	Influence on Strategic Alignment/Market Position
<i>W1, O1, O2, T3, T7, T8</i>	2	Influence on Cost Down Strategy
<i>S2, S3, W2, O3, O4, T1, T3, T8</i>	3	Influence on Supply Chain Resilience
<i>S1, O4, S2, T3, T5, T6, T8</i>	4	Influence on Administrative Work
<i>W2, O3, T8, T1</i>	5	Influence on General Logistics
<i>S2, S3, S4, O4, T1, T5, T6, T8</i>	6	Influence on Supplier Relationships
<i>S3, W3, O3, O4, T5, T6, T8</i>	7	Influence on Customer Rel. /Company Image

Second, several factors have an *Influence on the Cost Down Strategy* of BMA. The company's products are amongst the most expensive machines on the market. Their cost structure is above average and directly affects the cost saving potential (W1). Obviously, *O1 Cost Saving Potential in China* plays a major role in cost-down efforts. This is also linked to favourable economic conditions in China (O2). Cost savings in faraway countries are opposed by logistical challenges and increased lead times (T3). Longer lead times are accompanied by additional costs – i.e. they make it more difficult to plan requirements, supply production facilities and manage local warehouses. Naturally, *T7 Monetary Volatility and Currency Fluctuations* also influence costs. As mentioned in chapter 5.5 (p. 34), transactions in foreign currencies are always more disadvantageous than transactions in the national currency.

Third is the *Influence on Supply Chain Resilience*. Chapter 6.5 (p. 45) describes that sourcing in China greatly benefits from BMA's already existing production sites (S2). Having local support in foreign countries attributes to the overall supply chain stability. The same holds true for the already existing supplier network (S3). It is opposed by the comparatively low negotiation power of BMA as a special machinery manufacturer (W2). Competition is fierce – especially in China. Disruptions in the supply chain are easier to absorb if the own negotiating power is high. Disruptions caused by geopolitical events for example (T1). As seen in chapter 1.2 (p. 9), global crisis such as the Invasion of Ukraine, or the COVID-19 pandemic can cause supply chain disruptions – not only for steel parts. Likewise, *T8 Product Quality Fluctuations* are more difficult to deal with in Chain than within the local supplier range of 50km.

The fourth criteria is about the *Influence on Administrative Work*. Porter (1980, p. 85) describes that maintaining a profitable position – such as quality leadership – requires “total commitment”. Defending BMA’s position within the market is accompanied by additional work (S1). Likewise, partnerships and strategic agreements with suppliers need to be maintained (O4) and require administration. Support might come from the existing production site in Tianjin (S2). As mentioned in the previous paragraph, claim management with far away suppliers takes additional effort. Logistical challenges therefore influence the workload (T3, T8).

Fifth, the *Influence on general Logistics*. As explained many times, BMA’s comparatively low order and output volume results in low negotiation power (W2). When negotiating delivery terms, BMA may have to step back and accept less favourable conditions. Nonetheless, opening up to a new supplier base gives room to additional contingency options. The availability of other suppliers may have a positive influence via diversification (O3). However, the supply chain could be impaired through quality fluctuations in the supply (T8). Rework, returns and claim management takes additional efforts and gets in the way of smooth production planning.

Lastly, Sixth and Seventh, the *Influence on Supplier Relationships* and the *Influence on Customer Relationships*. Naturally, Strengths one to four play an important role. Part of BMA’s quality concept is to have close customer bonds (i. e. not only quality products, but also quality service and care). Good customer service is necessary in order to defend quality leadership (S1). Existing production sites as well as existing suppliers support the maintenance of a good supplier network (S2, S3, S4). This reduces the, usually challenging, pioneering work involved in establishing new relationships. O4 depicts that partnerships and strategic agreements should have a positive influence on supplier relationships.

8.3 Weighting of Decision Criteria

Decision criteria are by no means of equal importance. BMA might be able to take a greater advantage from one criterion than another. It seems logical that the company can limit administrative costs by already having production sites in Asia. Consequently, Criterion 4 *Influence on Administrative Work* may be weighted lower than another. Additionally, W1 *Above Average Cost Structure* shows that BMA has a competitive disadvantage in terms of production cost. As a result, Criterion 2 *Influence on Cost Down Strategy* might be very important. Each criterion is therefore assigned a weight. The weighting process is divided into two consecutive steps. First, groups of similar criteria are weighted. Second, the individual criteria receive a weight within their respective category. The multiplication of category and individual weights result in the actual criterion weight. Table 6 below demonstrates the weighting process from start to finish. Each category is separated by a thick line.

Table 6. Strategy is the most influential category

Decision Category	Weight (Categ.)	Decision Criteria	Weight (Individ.)	Weight (Criteria)
Strategy	45%	Influence on Strategic Alignment/Market Position	50%	22,5%
		Influence on Cost Down Strategy	50%	22,5%
Logistics	40%	Influence on Supply Chain Resilience	60%	24%
		Influence on Administrative Work	20%	8%
		Influence on General Logistics	20%	8%
Relationships	15%	Influence on Supplier Relationships	30%	4,5%
		Influence on Customer Relationship/Company Image	70%	10,5%
Σ	100%			100%

First, related criteria are grouped together for the first weighting process. It results in a total of three categories. The first group consists of *Influence on Strategic Alignment/Position* and *Influence on Cost Down Strategy*. Both criteria have a strong focus on the overall business strategy of BMA. Consequently, the category is named *Strategy*. As mentioned in chapter 1.3 (p. 11), the research objective falls into the area of strategic management. The influence on business strategy is extremely significant and is rated highest of all categories. The weight of the category is 45%. The second group's name is *Logistics*. All criteria with an influence on logistics or supply chain fall into this category – more precisely, these are *Influence on Supply Chain Resilience*, *Influence on Administrative Work*, and *Influence on General Logistics*. Compared to the previous category, this one is ranked slightly lower. While not as important as strategy, logistics are still highly influential. The weight is 40%. The last group is about relationships to both suppliers and customers as well as the company image. The name is therefore *Relationships* and consists of the criteria *Influence on Supplier Relationships* as well as *Influence on Customer Relationships/Company Image*. Although not as important as the previous categories, it should not be neglected. Group 3 is however the least important out of all categories and achieves a weight of 15%.

Second, all Decision Criteria are weighted within their respective groups. Within the categories, these individual weights sum up to 100% each. Both criteria in the first group are equally important. The weight is split into equal parts. Criterion weights for Strategic Alignment and Cost Down is therefore 22.5%. In the second group, Supply Chain Resilience is ranked the highest. Interviewee 3 and Bauer Employee 2 agree that it is the most important overall (personal communication, 16 July 2024). Consequently, Supply Chain Resilience scores a weight of 24% while the other two score 8% each. Lastly, Customer Relationship ranks higher than Supplier Relationship. This results in 4.5% for Customer and 10.5% for Supplier Relationship. Table 6 shows a hierarchy: Criteria one to three are the most influential while four to seven have less significance.

8.4 Execution

The overall result is now calculated. It is based on the previously determined weighting of the criteria and the evaluation of the alternative solutions found in chapter 7.3 (p. 54). All alternatives are listed according to their degree of openness for sourcing in China: First *Expansion*, followed by *Catch-Up*, then *Safeguarding*, and lastly *Avoidance*. For each alternative, the evaluated criteria are multiplied by the previously determined weighting. The weighted criteria for each alternative are then added together. The following paragraph explains the allocation of values for each alternative briefly. The score is mentioned in parentheses. A detailed description of the MCDA is located in Appendix 13 (p. 116).

Table 7. Alternative 3 "Safeguarding" scores the highest in MCDA

No.	Decision Criteria	Weight (Crit.)	Expansion		Catch-Up		Safeguarding		Avoidance	
1	Influence on Strategic Alignment/Market Pos.	22,5%	3	0,675	5	1,125	3	0,675	2	0,45
2	Influence on Cost Down Strategy	22,5%	9	2,025	7	1,575	3	0,675	0	0
3	Influence on Supply Chain Resilience	24%	1	0,24	3	0,72	9	2,16	6	1,44
4	Influence on Administrative Work	8%	2	0,16	4	0,32	8	0,64	10	0,8
5	Influence on Logistics	8%	1	0,08	3	0,24	6	0,48	7	0,56
6	Influence on Supplier Relationships	4,5%	2	0,09	4	0,18	7	0,315	7	0,315
7	Influence on Customer Rel./Company Image	10,5%	3	0,315	5	0,525	8	0,84	6	0,63
	Σ	100%		3,585		4,685		5,785		4,195

For criteria number one, Catch-Up scores the highest (5). The overall strategy seeks to moderately expand the sourcing activities into other countries. Expansion might be too aggressive (3), while Safeguarding might be too tamed (3). Avoidance does not adhere to this strategy but gives the opportunity to focus on local business (2). In terms of cost-Down, Expansion scores the highest, because of low price levels in China, followed by Catch-Up (7) and Safeguarding (3). Avoidance does not improve cost-Down since price levels remain basically the same. Supply Chain Resilience is most affected by Safeguarding, because, as the name implies, it is a protective strategy (9). Avoidance follows since it omits risky foreign business activities (6). Catch-Up and Expansion score comparatively low (3, 1). Here, the supply chain can be impaired by threats such as geopolitical risks.

Additional administrative work is the lowest in Avoidance (10), followed by Safeguarding (8), Catch-Up (4) and Expansion (2). The extend of foreign business activities determine the additional workload. Similarly, logistics are affected by this: Avoidance and Safeguarding have the

least negative impact (7, 6), while Catch-Up and Expansion have the highest negative impact (3, 1). Lastly, Supplier Relationships are ranked the highest for Safeguarding and Avoidance (7, 7). Catch-Up and Expansion rank lower (4, 2). Maintaining good supplier relationships is best done locally, while foreign relationships are harder to cultivate. The same holds true for Customer Relationships. However Safeguarding provides the possibility to emphasize relationship management (8). Avoidance (6), Catch-Up (5) and Expansion (3) follow.

This produces the overall results shown in Table 7. Alternative 1 Expansion scores the overall lowest score with 3,585. Following that, Avoidance scores 4,195. Catch-up achieves the second highest score with 4,685. With a difference of more than one unit, alternative 3 Safeguarding has the highest value at 5,785. As a result, the strategy Safeguarding is elaborated in the following chapter.

8.5 Consolidation of Results

Starting off, the SWOT factors are available in their original form. However, they are still useless as criteria for decision-making. Instead, they need to be converted into decision criteria using a categorisation matrix. Each SWOT factor can serve as an influence for several criteria. In turn, and to ensure that no finding is left out, each factor is represented at least once. Moreover, each criterion must be based on several SWOT criteria in order to be valid. This results in the seven decision criteria shown in Table 5 (p. 60). So far, all criteria are on the same level. However, some are actually more important than others. This is not only true in general, but also varies from company to company. The criteria must therefore be weighted. A two-stage weighting process achieves a precise result. Each criterion falls into one of three categories: Strategy, Logistics or Relationships. The categories are assessed first and then the criteria individually. Following this each criterion now has a weight. In the decision-making process itself, each strategic alternative is assigned a value between one and ten. Multiplied by the respective weight, the values are summed up. The execution shows the following order: Expansion (3.585), Avoidance (4.195), Catch-Up (4.685) and Safeguarding (5.785). Having the highest overall score, Safeguarding is chosen for further elaboration.

9 Discussion

9.1 Methodology and Procedure

In the previous chapter, the best of the four available alternatives was selected. In the following two chapters, the strategy Safeguarding is elaborated. This is done in accordance with the criteria described in chapter 7.4 (p. 56). To be precise, these are the following: Gradual and cautious expansion strategy; Development of Contingency Plan; Strategic Agreements and Partnerships; and Focus on Strategy, Compliance and Monitoring. The strategy is developed on the basis of the research above as well as in cooperation with Bauer Employee 2, Interviewee 3 and Interviewee 7 at BMA. The strategy is split into two parts. First an active part (chapter 9.2), the development of a gradual sourcing strategy, and second, a passive part (chapter 9.3), the development of a contingency plan. Chapter 9.4 summarises the results and makes the final recommendation to the company. This also concludes the main part of this master's thesis. It is followed by the final section.

9.2 Developing of a Gradual Sourcing Strategy

To begin with, gradual expansion is characterized by cautious procedures as opposed to immediate and forceful change. As a result, instead of high-risk, high-reward methods, the company should take slower but secure approach. This is achieved via two mechanisms: The usage of *Pilot Programs* as well as a *Phased Scaling* model.

Pilot Programs – in the context of the safeguarding strategy – are test runs in smaller scale to test the applicability and the extend of running large scale operations. It is part of safeguarding, because it ensures, that BMA can gradually incorporate Chinese suppliers in the supply chain. Instead of full force relocation, the company should start with small volumes and non-critical materials. Apart from this scope, a pilot program should set clear objectives: For example to validate that the quality of parts does meet the standard; reliability of the supplier and ease of doing business between countries.

Running a pilot program is ideally supervised by a responsible employee. The person in charge is ideally familiar with (international) sourcing and/or change management. The departments *Material Management* (in German “Materialwirtschaft”) as well as *Supply Chain Management* fit these specifications. It is advised to monitor the pilot programs using Key Performance Indicators (KPIs). Only then the success can be measured und used for upcoming decisions. Recommended are KPIs that compare transactions with Chinese and current suppliers. Examples are Supplier Defect Rate/Month and Total Cost of Transaction. KPIs are then used to evaluate the pilots.

This ties directly into the second mechanism, a phased scaling model. It is an extension of the pilot program to incrementally expand. BMA should develop a step by step process that is controlled and keeps risk at a low level. Based on KPI evaluation, pilot programs can prove to be successful or fail. In case of successful pilots, the company can start to incrementally scale up the supplier base and develop supplier relationships. Similar to above, the departments Materials Management and Supply Chain Management are best suited to continue here.

An important part of this procedure is to develop strategic agreements with suppliers to ensure long-term supply chain stability. These go one step further than traditional buyer-supplier relationships. Traditionally, BMA buys from the cheapest overall supplier. This is based on price offers stored in SAP (M. Bauer Employee 1, personal communication, 8 April 2024). However, BMA should take additional factors into account such as the importance of supplier relationship. It is therefore recommended to achieve a balance of low-cost procurement and supply-chain stability. Strategic agreements with Chinese suppliers are suitable to achieve said balance. The phased scaling model should increase strategic objectives between suppliers and BMA gradually – each phase strengthening the relationship.

In summary, the benefits of pilot programs and a phased scaling model are to mitigate risk, keep control, and manage the supply chain effectively. All of the aspects mentioned follow the risk-averse strategy of Safeguarding. Integrating foreign suppliers in the German supply chain is risky by nature. Consequently, both mechanisms ensure a secure expansion of the companies supplier base.

9.3 Development of a Contingency Plan

The measures above play an active role in developing BMA's sourcing operations. In contrast a contingency plan is a passive and preventive measure to secure supply chain stability. As of right now, BMA does perform Risk Management within the company. However, special issues that arise with sourcing in China are not covered. As steel parts make up a large amount of the production material, they are essential for operations. In case of an emergency, BMA needs a suitable method to manage supply of critical steel parts. Chapter 3.2.4 (p. 22) recommends a three stage layout: pre-, mid-, and post-crisis contingency measures.

First is the pre-crisis period: The emergency has not yet happened and it is unclear if and when it will actually happen. In this stage, the company should focus on assessing the risk, plan and prepare for possible scenarios. In detail this means to conduct a geopolitical risk analysis. Observing the tensions between POC and Taiwan has the highest priority. Then supply chain mapping. It is recommended to construct an overview of the overall supply chain from China to Germany. This works in tandem with the previously mentioned pilots and phases. This helps to identify

bottlenecks within the supply chain. A best-practice method is also to use scenario planning. BMA should come up with some crisis scenarios such as trade bans and embargos. This helps preparing for an actual emergency. Furthermore it lowers the overall amount of uncertainty within the company. Also recommended is a communication plan. In case of a disruption, there should be a clear procedure to keep all relevant stakeholders up-to-date.

Second is the mid-crisis period: An emergency happened and the consequences unfold. The objective is now to maintain operations as good as possible. The company is now in charge of crisis response. In case of embargos and trade bans, the supply chain must be re-routed. Using secondary routes is advised. As a case in point, suppliers from outside China (preferably Europe) should be activated. European suppliers are most likely outside of conflict areas and therefore a – at least somewhat – safe option. Supply chain disruptions naturally drive cost. It is therefore advised to develop cost control methods to counteract increased expenses. Strategic partnerships/contracts with suppliers may help with cost stability.

Lastly the post-crisis period: when the intensity of the situation begins to decrease, we enter a phase of recovery and analysis. The supply chain is now able to recover from past events and the company should be able to stabilize the connection between China and Germany. Inventories might be empty or low on stock. This would be the time to start replenishing stock. Critical materials have higher priority than of-the-shelf items. Depending on inventory management, it might be advised to keep additional stock as a buffer. After the crisis is the right time to assess the past. The company should analyse the performance during the crisis and make adjustments if needed. A cost analysis shall quantify the impact as well as guiding the company for future budgeting. The risk and contingency plans must be reviewed and adjusted. It is rather unlikely that no changes are needed since it is impossible to account for every detail in advance. Taking time to develop lessons learned and best-practices is therefore advised. Then – again – communication is key. Important stakeholders should be informed about the events. This is an opportunity to show what impact contingency planning had on the outcome of the events. It is part of being a quality leader to have quality communication. In the end, a detailed crisis report should describe the undertaking – covering pre-, mid-, and post-crisis measures in the process.

To sum it up, a suitable contingency plan covers the crisis holistically. It is proactive rather than reactive. With this in mind, BMA is probably not able to dodge a crisis completely, but rather mitigate its effects on the company. Risk management and developing a contingency plan should be done efficiently. Nevertheless, it is part of quality leadership to prepare for the future. Being unprepared shows vulnerability and uncertainty – two tributes that do not fit with a quality image.

9.4 Consolidation of Results and Recommendation

Safeguarding is the optimal strategic decision to answer the research problem. This also corresponds to the Bauer Triple A quality promise: performance-oriented on the one hand, and supply chain security on the other. Developing a Safeguarding strategy is therefore split into two parts: an active and a passive part. Both work in tandem to solve the research objectives (p. 11). Pilot studies serve as small trials to test out Chinese suppliers and evaluate their performance. Its purpose is sourcing selected steel parts to make decisions on future collaboration. Additionally, a phased scaling model gradually increases the sourcing activities and intensifies supplier relationships. Based on pilot programs, the sourcing can be scaled up in manageable phases. Both pilot programs as well as the phased scaling model is part of actively pursuing the Safeguarding strategy.

Passively on the other hand is to develop a contingency plan. Its purpose is essentially to ensure that production in Germany is able to continue in case of an emergency.. Proposed by Fred R. David is a three stage contingency plan – covering pre-, mid-, and post-crisis period. Before the crisis BMA must focus on preparation and scenario planning. Being prepared is essential to reduce the impact of a crisis. After a crisis happened, it is important to continue operations with the least amount of interruption. Using backup supply chains and cost control measures is advised. Lastly, after a crisis, BMA focuses on recovery and analysis. Performance during the crisis period should be reviewed and adjusted when needed. Communication with stakeholders during all three phases is essential.

I strongly advise Bauer Maschinen GmbH to follow the recommendations above and to wisely use the contents of this thesis. Chapter 1.2 (p. 9) brought forth three distinct problems for BMA: First, how to handle the rising cost pressure; second, how to manage supply chain stability; and third, how to maintain a secure market position. Adopting the safeguarding strategy for *sourcing steel parts in China* is the solution to solve **all** three problems simultaneously. Consequently, this thesis closes the research gap. By applying the contents of this thesis, BMA will be able to solve the research problem thoroughly.

10 Conclusion

10.1 Summary

Globalization drives competitive forces. Mechanical engineering companies face increased cost pressure and supply chains are threatened by growing crisis potential. Bauer Maschinen GmbH occupies a special position as a manufacturer of specialised machinery. Product costs are high, sales volumes on the other hand are low. The company is able to maintain a profitable position thanks to its position as quality leader. Recent analyses show that prices for steel components in China are significantly below the European average. Machinery products have a large proportion of steel components. Sourcing in China is therefore thought to offer potential savings. However, as a relocation of purchasing activities is affected by many things, all influences must be taken into account.

Bauer Maschinen GmbH is the manufacturer of machines for specialised construction engineering. In recent decades, the company has already expanded to other continents and now produces also in Tianjin, China. In this thesis, the possibility of relocating sourcing activities to China is demonstrated using BMA as an example. The methodology of this research is the *Strategy Formulation Analytical Framework*. At its centre is a SWOT analysis. The inclusion of external environmental factors and the internal company perspective ensures a holistic view. The process consists of three parts: Firstly, internal and external results are collected separately. This forms a basis for the SWOT analysis (second). Third, the best sourcing strategy is selected and explained.

Two well-known frameworks are important: the importance of market position as well as the influence of Porter's Five Forces.

Above all, BMA draws **Strengths** (S) from its position as quality leader. Additionally, the company already has production facilities in China with an associated supplier network. Furthermore, BMA generally maintains very close supplier relationships and can thus counteract some competitive forces. BMA's main **Weaknesses** (W) are its comparatively high cost structure, low order volumes for suppliers and the high administrative effort required to support foreign activities. Internal factors are offset by external **Opportunities** (O). Generally favourable conditions in China and an increased selection of suppliers are available. There is also the opportunity to enter into strategic partnerships with suppliers in order to increase the resilience of the supply chain. Outstanding is the cost-saving potential in China. The price level for steel parts is significantly lower than in Germany. Opposing that, the number of **Threats** (T) is high. There are new logistical and regulatory challenges. Despite an existing supplier network, it is difficult to establish supply relationships in China. Despite improving standards, fluctuations in quality can occur.

A combination of external and internal perspectives results in four strategic options: Expansion (SO), Catch-Up (WO), Safeguarding (ST), and Avoidance (WT). All are characterised by special features, but only one is to be selected. The SWOT analysis results in several selection criteria for a Multicriteria Decision Analysis. Criteria are weighted and each strategic alternative is assessed according to its positive impact on BMA. The process shows that *Safeguarding* is the best option. Developing a Safeguarding strategy is split into an active part, a gradual sourcing strategy and a passive part, a contingency plan. Both parts work in tandem to formulate a holistic recommendation.

10.2 Evaluation

As described in chapter 4.4 (p. 27), the research in this Master's thesis can be evaluated via two factors: *Validity* and *Reliability*. Zohrabi (2013, pp. 258-260) describes criteria for evaluating both. Appendix 14 (p. 117) shows all criteria for both Validity and Reliability. It is also indicated whether a criterion is fully, partially, or not fulfilled. Furthermore, the maintenance of triangulation should also be clarified. Appendix 12 (p. 115) shows whether triangulation exists for each individual SWOT-factor. If a criterion cannot be evaluated without doubt, this is marked with an asterisk (*). The following paragraphs will evaluate all criteria with regard to this thesis.

First is Reliability. At the beginning, in Chapter 1.3 (p. 11), both the status of the researcher as well as his relationship to the company and participants are disclosed. The choice of interviewees and participants in the research is described in Chapter 4 (p. 26). In addition, individual participants are described in more detail at the beginning of each new chapter, e.g. in the result chapters 5.1 (p. 28) and 6.1 (p. 38). The profession/job description is always added the first time a person is mentioned. The second chapter of this thesis (p. 13) discloses the social/professional environment. Additionally, the academic environment of the researcher is explained. In the same way, chapters 1 and 2 are devoted to analytical constructs and premises; terms are defined (p. 14) and units are specified in the appropriate places. The entire Chapter 3 (p. 17) serves to explain premises and concepts. For subsequent references, the relevant place in the review is always indicated. The same applies to criterion number 5: The methods for data collection and analysis are described in detail in Chapter 4.

Low-interference Description is difficult to assess by the researcher himself. However, information from interviews is always labelled as such. All transcriptions are attached. If a statistic is referred to, it is always mentioned. All statistics are attached. According to Bauer Employee 2 – internal supervisor of the Master's thesis – this is sufficient for the purposes of the company. Zohrabi (2013, p. 254) and Kakilla (2021, p. 3) find this level of interference acceptable. Several researchers are not involved in this work. Nevertheless, regular meetings are held to coordinate

the results with the supervisor (Fridays, 12:00 UTC+2) and with the supply chain department (Wednesdays, 12:00 UTC+2). Peer examination is present. Especially – but not only – in the area of quantitative research on the topic, the Master's thesis builds on the research of others (e.g. ENGINEERING ASSOCIATION statistics). Lastly, Data is recorded mechanically. Any newly collected information is either inserted in the text or added as an appendix. All interviews are transcribed.

Validity comes next. The first criteria is Triangulation. It is maintained for almost every SWOT-factor. For three factors only two sources are available – they are therefore marked as partially triangulated. Member checks have taken place, but not with every single person. Interviewee 1 left his position at ENGINEERING ASSOCIATION in June 2024 and is therefore no longer available for member discussions. One criterion that was not met is long-term observation. The time frame of this master's thesis does not allow a long-term view. However, every data survey is analysed over a period of several years. The possibility of long-term observation is included in the following chapter. Zohrabi (2013, p. 259) mentions peer examination again here. As this criterion has already been discussed, no further explanation is provided. Most of the participants in the research are informed about the results of the work through regular dialogue. Weekly meetings are listed above. It is difficult to judge or discard one's own researcher bias. However, the position of the researcher is mentioned in the beginning; information not collected by the researcher is included in the list of references; the research procedure is explained at the beginning of each chapter.

10.3 Outlook

Bauer Maschinen GmbH is caught between the poles of globalisation, cost pressure and crisis potential. There is a need for action in many areas in order to successfully master this challenge. The scope of this thesis focusses on the sourcing of steel components in China. However, beyond the area of consideration, there are other fields of action that are necessary to address. As a case in point, and in addition to China, there are other regions which are worth investigating. Furthermore, this master's thesis is a strategic recommendation. However, it is not an implementation at an operational level.

As shown in chapter 1.2 (p. 9), the steel prices in India stay moderately low and appear to be (relatively) unaffected by recent events such as the Covid-19 pandemic and invasion of Ukraine. India may be similarly suitable as a sourcing destination. This is confirmed by an interview with Interviewee 8 –Buyer at BAUER Equipment India's Mumbai plant. General economic conditions in India are favourable. Interviewee 8 mentions, that the gross domestic product is developing well – which is also confirmed by other sources (Acharya et al, 2024; Majumdar, 2024; O'Neill,

2024). Furthermore, India is planning huge investments over a period of up to 30 years, Interviewee 8 says. Indeed, according to India Brand Equity Foundation (2024), India is estimated “to invest \$840 billion over the next 15 years into urban infrastructure” alone.

Furthermore, Interviewee 8 describes that the crisis potential in India is comparatively low. With the exception of China and Pakistan, India maintains very good relations with other countries and would also like to participate economically. Interviewee 8 emphasises the strength and progressiveness of the current democratic government. However, this is disputed by other sources. The 2024 general elections in particular have been criticised for halting India's progressiveness and paving the way for authoritarian and anti-democratic changes (Jaffrelot, 2024; o, 2024; Sharma, 2024). These two poles reveal a research gap. On the one hand, economic conditions in India appear to be good, but there is disagreement about the political situation. Another (Master's) thesis should investigate if it is also worth sourcing of steel components in India.

Chapter **Error! Reference source not found.** (p. **Error! Bookmark not defined.**) describes how the purchasing process at Bauer Group can be divided into a strategic and an operational part. The topic of *Sourcing in China* can be categorised in the same way. This master's thesis has developed the strategic blueprint. Implementation at an operational level was not included. The central methodology of this work, the Strategy Formulation Analytical Framework by Fred R. David, is part of a larger structure: the *Comprehensive Strategic-Management Model* (2011, p. 176). SFAF is only the first of a total of three steps towards the complete development of a strategy (ibid.). This is followed by step two, *Strategy Implementation*, and step three, *Strategy Evaluation*. Both appear suitable for the framework of a Master's thesis. To build on the results of this work, it is recommended to follow the Comprehensive Strategy Formulation Framework. David describes in detail the procedure for a holistic strategy.

Chapter 3.2.4 (p. 22) described that managing the supply chain is an ongoing process. The same applies to other corporate processes. Strategic management in particular is subject to the constantly changing business landscape (Pryor, 2023). As mentioned at the beginning, globalisation too is a dynamic process that is subject to fluctuations. Change is inevitable and its consequences cannot always be predicted. In the same way, strategies should be able to withstand such fluctuations. Even if strategic management cannot predict which developments will happen in detail, one can be sure that change will take place as surely as autumn follows summer.

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Appendices

Appendix 1. Interview Transcription with Interviewee 1

Interviewee Position: Economic Analyst

Dates: 29.04.2024, 15:00 – 17:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 1.1: Für meine Arbeit möchte ich untersuchen ob der Einkauf von Stahlbauteilen in China für die deutsche Produktion lohnenswert ist. Bei meinen Recherchen bin ich auf die ENGINEERING ASSOCIATION Statistikdatenbank gestoßen. Können Sie mir die Inhalte der Statistikdatenbank kurz schildern?

Sicherlich. Ich bearbeite die Statistiken für den Bereich Asien und lege den Fokus besonders auf makroökonomische Entwicklungen – vereinzelt gibt es jedoch auch Informationen zu Stahlbau. Grundlegen möchte ich sie auf einen Bericht verweisen, welcher von mir jährlich erstellt wird [shows report „Machinery & Equipment in China Q4 2023“]. Dort führen wir makroökonomische Entwicklungen für einzelne Länder. China ist der größte Export- und Importmarkt im asiatischen Raum und ist deshalb wohl besonders relevant. Neben China führen wir aber auch Berichte für beispielsweise Indien [shows report „Machinery & Equipment in India Q4 2023“]. Die Berichte aus dem Jahr 2023 sind die aktuellsten Veröffentlichungen. Diese [Berichte] gehen noch mehr ins Detail und zeigen darüber hinaus auch Prognosen auf. Darüber hinaus möchte ich auf zwei Bereiche der Statistikdatenbank hinweisen: Zum einen der interaktive Report „Makroökonomische Länderinformationen (interaktiver Report)“; zum anderen „OECD Konjunkturindikatoren“. Beides sind PowerBI Berichte – sie werden also stetig aktualisiert und können auch exportiert werden. Grundsätzlich würde ich Empfehlen die Kennzahlen zu Deutschland und China zu vergleichen.. Die Berichte [refers to report „Makroökonomische Länderfaktoren“] geben allgemeine Informationen zu Ländern. In Hinblick auf das Thema Stahlbau sollte die Konjunktur des Maschinenbaus betrachtet werden. Stahlbau und Maschinenbau sind eng miteinander verwandt.

Question 1.2: Der Bericht „Machinery & Equipment in China Q4 2023“ zeigt einige Statistiken. Können Sie auf mögliche relevante Inhalte hinweisen?

Der Bericht führt Informationen für mehrere Branchen. Speziell zum Thema Stahlbau werden auch Statistiken geführt, jedoch sollten Schlussfolgerungen auf Basis mehrerer Quellen gezogen

werden. Grundsätzlich würde ich schätzen, dass die wirtschaftlichen Bedingungen für deutsche Firmen in China recht gut sind. Der Trend, den wir aktuell beobachten ist, dass mehrere Baumaschinenhersteller nach China expandiert haben und dort [Stahlbau] einkaufen. Ein guter Indikator für die Entwicklung sind meiner Meinung nach stets CPI [Commodity Price Index] und PPI [Producer Price Index]. Die Statistik „Commodity Prices, Producer Price Index and Industrial Profits“ zeigt beispielsweise, dass der Stahlpreis den grundsätzlichen Entwicklungen von CPI und PPI folgt. Diese sind – wie auch in allen anderen Ländern – Schwankungen unterworfen. Diese wiederkehrenden Schwankungen sind einerseits durch den Wirtschaftszyklus bedingt, aber auch durch die großen Ereignisse der letzten Jahre – im speziellen COVID-19 und die Invasion der Ukraine. Dass aber der Maschinenbausektor noch immer wächst lässt sich in den Statistiken „Macroeconomic Development in China“ und „Production of Machinery & Equipment and Electrical Machinery“ erkennen. Industrielle Produktion wächst stetig und ist auch durch die Krisen [refers to COVID-19 and Invasion of Ukraine] nur leicht beeinflusst – vor allem geringer als der Real Estate Sektor. Auch der Spezialmaschinenbau verzeichnet stetiges Wachstum. Eine weitere Statistik [shows report „Expansion of Total Bank Loans 2013 – 2023 Q3“] zeigt beispielsweise dass die Vergabe von Krediten im produzierenden Gewerbe nach dem COVID Ausbruch sogar ansteigt.

Question 1.3: Welche Gründe gibt es Ihrer Meinung nach für diese Entwicklungen? Und welche Stellung nehmen Sondermaschinenbauer wie BMA ein?

Gründe existieren wohl viele. Alle im Detail zu untersuchen ist wohl nur mit erheblichem Aufwand möglich. Darüber hinaus ist die Wirtschaftspolitik Chinas äußerst komplex und vielschichtig. Der aktuelle Präsident [Xi Jinping] ist äußerst darauf bedacht den internationalen Einfluss von China zu stärken. Dafür gibt es viele Beispiele: Die Belt and Road Initiative oder Made in China 2025. Durch enorme Investitionen möchte China die eigene Position stärken.

Einige Branchen werden durch die Regierung begünstigt behandelt. Das sind in der Regel die, welche das übergeordnete Ziel unterstützen. Der momentane Trend ist Elektrifizierung [refers to statistic „Investment by Selected Industrial Sectors“]. Das zeigt sich vor allem bei Investitionen in Batterietechnologien, Solarpanelen und Halbleiterteilen. Aber, wie schon angesprochen, auch das produzierende Gewerbe nimmt – durch die Belt and Road Initiative – eine begünstigte Stellung ein.

Appendix 2. Interview Transcription with Interviewee 2

Interviewee Position: Managing Director Engineering Association

Dates: 07.05.2024, 10:00 – 11:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 2.1: In meiner Masterarbeit untersuche ich, ob der Einkauf von Stahlbauteilen für unsere deutsche Produktion lohnenswert ist. Wie schätzen Sie ein solches Vorhaben ein?

Grundsätzlich ist das ein Trend, den wir schon seit längerer Zeit beobachten. Bauer hat meines Wissens nach bereits seit einiger Zeit Standorte in China. Ähnlich haben sich auch andere Maschinenbauunternehmen verhalten. Besonders zu Beginn des 21. Jahrhunderts haben äußerst viele Unternehmen damit begonnen Tochtergesellschaften in China zu gründen [refers to statistic „Year of Establishment of legal Entities between 1986 and 2023“]. Das liegt wohl an den enormen Kostenvorteilen von China gegenüber Deutschland. Lohnkosten sind deutlich niedriger. Wie in der Statistik ersichtlich, sind die Neugründungen zwar deutlich zurückgegangen aber eine Erholung ist wohl denkbar – wenngleich nicht so stark wie es Anfang der 2000er der Fall war. Direkt damit zusammenhängend ist auch der Kapitalzufluss nach China [refers to statistic „Foreign Direct Investment Inflow into China“]. Grundsätzlich sind die wirtschaftlichen Bedingungen in China recht gut für internationale Unternehmen. Nichtsdestotrotz sollten auch andere Faktoren berücksichtigt werden. Einzig Kosteneinsparungen zu sehen wäre zu blauäugig.

Question 2.2: Meine Recherchen haben ergeben, dass die chinesische Regierung sehr zielorientiert in ihrer Wirtschaftspolitik ist. Hat dies Auswirkungen auf internationale Handelsbeziehungen?

China hat ambitionierte Ziele, die es mit Hilfe der Wirtschaftspolitik erreichen will. Das zeichnet sich in groß angelegten Projekten ab. Die Vorzeigeobjekte der chinesischen Regierung sind dabei die Belt and Road Initiative sowie der Made in China 2025 Slogan. Beide sollen dafür sorgen China zu weiter zu industrialisieren und unabhängig zu machen. China möchte bis zur Mitte des Jahrhunderts die Weltmacht werden und damit die USA ablösen. China mag zwar national äußerst autoritär sein, möchte aber gleichzeitig den internationalen Einfluss erhöhen – und damit werden Handelsbeziehungen, auch mit Deutschland, generell entwickelt. Auch der Bereich Maschinenbau hat grundsätzlich eine gute Stellung. Bei ENGINEERING ASSOCIATION nehmen wir den Trend wahr, dass mehr und mehr Firmen eine Internationalisierung anstreben. China ist für viele ein vielversprechendes Ziel.

Question 2.3: Angenommen die Firma Bauer strebt eine Ausweitung der Handelsbeziehungen mit China an – welche Hindernisse und Gefahren sind dabei zu beachten?

Der Grundsatz ist: Internationalisierung muss wohlbedacht und geplant sein – nicht nur in China aber auch in anderen Ländern. Deutsche Maschinenbauer sind in der Regel über viele Jahrzehnte im eigenen Land gewachsen und sehen internationale Geschäfte als verlockende Möglichkeit zur Kostensenkung. Grundsätzlich ist dem auch so, aber Internationalisierung ist vielschichtig und komplex. Gerade in China gibt es einige Dinge zu berücksichtigen. Generell sollten Informationen aus den Zielländern durch zusätzliche Quellen gegengecheckt werden. Sich nur auf eine Quelle zu verlassen wäre bei Unterfangen von dieser Größenordnung nicht ausreichend.

Hürden sind beispielsweise die Sprachbarrieren und doch sehr unterschiedliche Kultur. Wie bereits angesprochen, deutsche Maschinenbauer sind sehr geschult bei Geschäften im eigenen Land. Das internationale Umfeld kann aber stark abweichen. Häufig erleben wir, dass Geschäfte in Osteuropa getätigt werden. Dieses Umfeld ist, trotz der Geschichte der Sowjetunion, immer noch recht nahe zur deutschen Kultur. Englischkenntnisse sind vorhanden. Chinesisches Business ist jedoch anders. Englischkenntnisse sind oft nicht vorhanden – es wird also in der Regel ein Übersetzer benötigt. Darüber hinaus ist es wohl schwieriger neue Lieferantenbeziehungen aufzubauen als in Deutschland. Im Bereich Baumaschinen gibt es große Firmen, die am Markt wohl eine größere Verhandlungsmacht haben als Spezialmaschinenbauer. In diesem Zusammenhange fallen mir Liebherr, Caterpillar, Sany und XCMG ein. Alle haben große Marktanteile

Question 2.4: Wie verfahren andere ENGINEERING ASSOCIATION -Mitgliedsunternehmen beim Handel mit China? Gibt es darüber Informationen?

Wie schon erläutert, gab es in den frühen 2000ern den großen Trend Tochterunternehmen in China zu gründen. Das heißt, dass nicht nur Bauer aber auch viele andere Maschinenbauunternehmen Erfahrung mit China haben. Dementsprechend haben auch diese Unternehmen dieselben Überlegungen wie Bauer. Auch sie fragen sich ob sich der Einkauf in China lohnt. Generell sind schon viele Unternehmen dazu übergegangen in China einzukaufen. Welche Produktkategorien genau ist uns nicht bekannt. Es ist aber wohl stark davon auszugehen, dass Stahlbauteile einen guten Teil davon ausmachen.

Appendix 3. Interview Transcription with Interviewee 3

Interviewee Position: Manager at BMA – formerly Quality Representative

Dates: 29.04.2024, 14:00 – 15:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 3.1: Das Unternehmenskredo „Bauer Triple A“ beschreibt Qualität als die zentrale Säule des Unternehmens. Welchen Stellenwert hat Qualität Ihrer Meinung nach im Fertigungsprozess?

Das ist richtig. Qualität in allen in allen Bereichen ist die Basis für unsere Unternehmensaktivitäten. Damit ist nicht nur Qualität in den Produkten gemeint – das ist selbstverständlich. Vielmehr geht es um Qualität in allen Bereichen. Wie der Name „Bauer Triple A“ vermuten lässt, geht es um Qualität mit drei Perspektiven „Health, Safety, Environment“, „Culture, Quality, Ethics“, und „Performance“ [refers to document ce_91_en_BMA-G „Bauer Triple A“]. Das bedeutet das es zu unseren Werten gehört, dass Arbeitssicherheit, Gesundheitsschutz und Umweltverträglichkeit in der Arbeit gewährleistet sein müssen. Darüber hinaus wollen wir durch einen kontinuierlichen Verbesserungsprozess die Qualität unserer Produkte steigern. Wir handeln gegenüber unseren Kunden, Partnern und Mitarbeitern immer loyal und verantwortungsbewusst. Und wohl für dieses Thema wichtig, wir stellen durch unsere Arbeit den langfristigen Erfolg des Unternehmens sicher. Bauer Triple A soll also in alle Unternehmensprozesse einfließen. Es ist Teil unserer Unternehmensphilosophie.

Question 3.2: Der bekannte Wirtschaftswissenschaftler E. Porter behauptet, dass Unternehmen sich am Markt positionieren müssen um langfristig erfolgreich zu sein. Denken Sie, dass dies auch auf BMA zutrifft?

Wie vorher bereits angesprochen ist Qualität in allen Dingen die Basis unserer Firma ist. Dementsprechend haben wir uns auch am Markt positioniert. Als Spezialmaschinenbauer bedienen wir eine, vergleichsweise, kleine Zielgruppe besonders gut. Das wird auch im Hinblick auf die Entwicklung des Servicegeschäfts sichtbar. Serviceleistungen gewinnen immer mehr an Bedeutung. Als Sondermaschinenbauer haben wir ein vergleichsweise teures Produktportfolio und recht niedrige Stückzahlen – besonders im Vergleich zu anderen Baumaschinenherstellern wie zum Beispiel Liebherr, oder auch chinesische Konkurrenten wie Sany oder XCMG. Unser Marktanteil ist demnach auch klein. Wir sind jedoch profitabel durch unsere Positionierung als Qualitätsführer. Besonders – wie schon gesagt – auch im Hinblick auf das Servicegeschäft.

Diese Positionierung wollen wir um jeden Preis halten. Wie bereits bekannt lassen sich in Asien wohl enorme Kostenvorteile realisieren. Diese sollten wir jedoch nur unter der Voraussetzung nutzen, dass die Position als Qualitätsführer sichergestellt ist. In Bezug auf logistische Themen sind wir eher freier, aber die Qualität unserer Produkte darf auf keinen Fall leiden. Generell ist

jedoch davon auszugehen, dass die Zuliefererqualität in Asien immer besser wird – besonders im Bereich Stahlbau sollten asiatische Zulieferer schon ein sehr gutes Qualitätsniveau aufweisen. Andere Firmen – darunter auch Firmen mit äußerst komplexen Produkten – lassen auch schon länger in Asien fertigen.

Question 3.3: Ein weiteres bekanntes Konzept von Porter sind die „Five Forces“, auch bekannt als Branchenstrukturanalyse. Wie sehen Sie die Position von BMA in der Branche?

Wir haben ein Alleinstellungsmerkmal als Spezialmaschinenbauer. Das gibt uns natürlich eine besondere Position innerhalb in der Industrie. Gepaart mit der Qualitätsführerschaft verhilft uns das natürlich zu mehr Stärke innerhalb der Branche. Deswegen zählen wir auch nicht zum generellen Maschinenbau sondern zum Sondermaschinenbau. Das spiegelt sich auch in den Projekten des Segments Bau wieder. Wir haben besondere Maschinen für besondere Aufgaben. Andererseits haben wir auch eher geringere Verkaufszahlen und dazu noch ein überdurchschnittliches Preisniveau. Das mindert natürlich unsere Stellung in der Industrie. Die Konkurrenz – besonders im Standardmaschinenbau – verkauft deutlich höhere Stückzahlen. Bezogen auf den Einkauf [von Stahlbauteilen] kaufen diese natürlich mehr ein. Das führt dementsprechend zu niedrigerer Verhandlungsmacht, um auf die Kräfte von Porter einzugehen.

Question 3.4: Welche Chancen und Risiken sehen Sie in dem Vorhaben Stahlbauteile auch in China einzukaufen?

China ist recht vielversprechend. Wie bereits bekannt, sind in China wohl Kostenvorteile zu realisieren. In welchem Ausmaß kann ich nicht genau sagen, doch ist die vorherrschende Meinung innerhalb der Firma, dass der Vorteil wohl sehr groß ist. Stahlbau in Deutschland ist recht teuer. Deshalb haben wir auch begonnen, Teile aus Osteuropa einzukaufen, wo der Preis noch verhältnismäßig niedriger ist. Ich schätze, dass der Kostenvorteil wohl die größte Chance ist. Dagegen steht, dass der Einkauf im Ausland wohl immer komplizierter ist als im eigenen Land. Es bedeutet einfach mehr Arbeitsaufwand. Ein Beispiel: Sollten Qualitätsmängel in der Wareneingangsprüfung oder während der Produktion auftauchen stellen wir einen Claim an den Lieferanten. Es scheint logisch, dass Claim Management über den halben Erdball intensiver und komplizierter ist als in Deutschland.

Appendix 4. Interview Transcription with Interviewee 4

Interviewee Position: Manager at Production Plant in Tianjin, China

Dates: 08.04.2024, 10:30 – 11:30 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 4.1: In meiner Arbeit untersuche ich ob der Einkauf von Stahlbau in China für die deutsche Produktion lohnenswert ist. Welche Herausforderungen sehen Sie in einem solchen Unterfangen?

Grundsätzlich haben wir bei Bauer natürlich schon Erfahrung in China. Der Produktionsstandort in Tianjin, und der Vertriebsstandort in Shanghai gibt uns einen enormen Vorsprung wenn wir die Unternehmensaktivitäten in China ausweiten wollen. Es gibt natürlich die üblichen Barrieren, die uns auch schon früher betroffen haben. Das Englisch in China hat immer noch nicht den Status einer landesweiten Sprache. Im Werk Tianjin kommt es durchaus vor, dass Kollegen keine gemeinsame Sprache sprechen und ein Übersetzer hinzugezogen wird. Auf Managementebene ist Englisch jedoch weitverbreitet. Ihre Arbeit beschäftigt sich mit Einkauf, also wird wohl der Kontakt zu Lieferanten eine Rolle spielen. Bei Lieferanten ist ein Übersetzer Standard – die Englischkenntnisse der Lieferanten sind noch nicht sehr gut. Tatsächlich haben sich die Englischkenntnisse hier jedoch stark entwickelt. Die Regierung fördert Englischunterricht sehr stark mittlerweile. Die Realität ist jedoch, dass ein Übersetzer – auch in den nächsten Jahren – noch notwendig ist. Die chinesische Kultur ist natürlich auch fundamental anders als die deutsche. Also schätze ich, dass es Übung bedarf die neue Lieferantenbeziehungen aufzubauen, und die bestehenden zu pflegen.

Appendix 5. Interview Transcription with Interviewee 5

Interviewee Position: ESG-Manager

Dates: 25.04.2024, 15:00 – 16:00 (UTC+3) & 10.07.2024 17:00 – 18:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 5.1: Meine Recherchen haben ergeben, dass das Thema Nachhaltigkeit für Unternehmen an Bedeutung gewinnt. Gilt das auch für BMA, und falls ja, welche Auswirkungen hat dies für die Firma?

Dem ist so. Es ist ein großer Trend, dass sich Unternehmen mit dem Zwang zu nachhaltigen Methoden konfrontiert sehen. Das ist auch für unsere Firma der Fall. Besonders in den letzten Jahren wird durch verschiedene Stakeholder Druck aufgebaut. Die BMA ist deshalb, so wie auch andere Maschinenbauer, gezwungen zu handeln. Es war deshalb das Ziel eine Nachhaltigkeitsstrategie anzufertigen, die unsere Bemühungen und Ziele widerspiegelt. Die Nachhaltigkeitsstrategie ist im Bauer Intranet Binside als in_566_en_BMA-G zu finden.

Bei der Definition der Nachhaltigkeitsstrategie werden sowohl interne als auch externe Themen berücksichtigt. Sie ist also grundsätzlich zweigeteilt. Intern sind das vor allem unsere eigenen Werte, die wir als Unternehmen leben wollen. Externe Werte werden vor allem, wie der Name vermuten lässt, durch externe Stakeholder verursacht. Extern haben sich besonders drei Themen als kritisch herausgestellt: die Verpflichtung zur Reporterstellung, genannt CSRD; die Verordnung für Emissionszertifikate für Importe, genannt CBAM; sowie die EU-Taxonomie für nachhaltige Kapitalströme. Bei diesen Angelegenheiten sind wir zukünftig gezwungen sie zu erfüllen. Alle drei Verordnungen müssen von uns erfüllt werden, sonst würden hohe Strafen anfallen. Das nicht-erfüllen würde darüber hinaus wohl auch einen Imageschaden verursachen.

Question 5.2: Zu allen angesprochenen Themen möchte ich mir ein genaueres Bild machen. Beginnen wir mit den externen Verordnungen. Welchen Einfluss hat CSRD auf BMA? Welche Pflichten gehen daraus hervor? Könnte der Einkauf von Stahlbau in China Einfluss darauf nehmen?

CSRD zwingt Firmen zum Reporting von Unternehmensaktivitäten, die sich schädlich auf Nachhaltigkeit auswirken. Diese Pflicht zum Reporting wird für uns ab dem kommenden Jahr [2025] gelten. Kommen wir dem nicht nach sind wohl erhebliche Strafen zu erwarten – in welchem Ausmaß ist mir jedoch nicht bekannt. Bisher haben wir daher noch keinen solchen Report veröffentlicht. Annäherungsversuche haben wir aber bereits mit den jährlichen Nachhaltigkeitsberichten

gemacht. Momentan wird die zukünftige Berichterstellung vorbereitet. Das findet auf Basis einer Wesentlichkeitsanalyse statt. Das ist notwendig, da diese [Wesentlichkeitsanalyse] von einem Wirtschaftsprüfer überprüft wird. Im speziellen bedeutet es, dass wir die für unser Unternehmen wesentlichen Bereiche identifizieren müssen. Die Bereiche sind anschließend für das Reporting bindend. Diese [Bereiche] sind in der ESRS Anordnung der Europäischen Kommission zu finden [Delegierten Verordnung „Europäische Standards für die Nachhaltigkeitsberichterstattung (ESRS)“].

Wir sind derzeit in noch inmitten der Vorbereitung, aber die folgenden Bereiche sind sicherlich relevant: E1 Klimawandel, S1 Eigene Belegschaft, S2 Arbeitskräfte in der Wertschöpfungskette, und G1 Unternehmenspolitik. Einkaufen in China würde wohl einen Einfluss auf die berichteten Zahlen haben. Es gibt aber keinen vorgegebenen Grenzwert, welcher überschritten werden kann. Bei CSRD geht es grundsätzlich nur darum Transparenz gegenüber den Stakeholdern zu schaffen.

Question 5.3: Welche Stakeholder sind für BMA von Relevanz? Und was sind die Auswirkungen des Einflusses?

Im Rahmen der Wesentlichkeitsanalyse haben wir auch eine Stakeholderanalyse gemacht [refers to Excel file "Einbindung der Interessensträger"]. Dort haben wir die Stakeholder aufgelistet und nach *Einfluss* und *Höhe des Interesses* gelistet. Das hat ergeben, dass die drei größten Stakeholder [für CSRD] sind demnach die Kunden, Anteilseigner, und das Management. Aber es sind auch Mitarbeiter, Bank/Geldgeber, Zulieferer. Für nähere Informationen würde Ich mich daher an diese Auswertung halten. Nachdem wir bestimmte Unternehmensaktivitäten offenlegen, können diese Stakeholder unser Verhalten einsehen. Direkte Auswirkungen sind schwierig vorherzusehen, aber es wäre wohl davon auszugehen, dass – mit zunehmender Wichtigkeit von Nachhaltigkeit – Stakeholder mehr auf Nachhaltige Praktiken und Unternehmen achten werden.

Question 5.4: Die zweite Verordnung war CBAM. Welche Auswirkungen hat das auf BMA? Und hat der Einkauf von Stahlbauteilen in China Einfluss darauf?

CBAM [Carbon Border Adjustment Mechanism] ist eine Maßnahme des CO₂-Grenzausgleichsystems der Europäischen Union. CBAM soll für die Zukunft die Treibhausgasemissionen durch importierte Güter bepreisen. Damit sollen grundsätzlich Wettbewerbsnachteile im Sinne der Nachhaltigkeit ausgeglichen werden. In Deutschland produzierende Unternehmen sind durch den Zertifikatserwerb bereits betroffen. Unternehmen, die im Ausland produzieren und ihre Erzeugnisse importieren würden demnach einen Vorteil erhalten. Der Maschinenbausektor ist auch davon betroffen. Die Einfuhr von Stahlerzeugnissen fällt sicherlich auch darunter. Grundsätzlich

herrscht eine Übergangszeit vom 1. Oktober 2023 bis 31. Dezember 2025 [refers to ENGINEERING ASSOCIATION article³]. Bis dahin wird es keinen Preis für Importe geben. Ab 2026 müssen jedoch für jede Tonne CO₂ Zertifikate erworben werden. Genauere Informationen sind öffentlich erhältlich – besonders in den Anhängen der Verordnung. Falls Waren eingeführt werden, die unter CBAM fallen, muss der Europäischen Kommission alle drei Monate Bericht erstattet werden. Dort müssen Informationen zu den CO₂-Emissionen erscheinen sowie der lokale CO₂-Preis – sollte es einen geben. Kaufen wir also zukünftig Stahlbauteile in China, müssen wir definitiv Zertifikate erwerben

Question 5.5: Wie funktioniert der Zertifikaterwerb und gibt es einen Preis je Zertifikat? Und welche Auswirkungen hat die Nichtbeachtung?

Das funktioniert ähnlich wie der Handel mit Unternehmensanteilen an der Börse. Zertifikate werden durch Unternehmen eingekauft und anschließend für den Import von Waren verwendet. Zertifikate sind jedoch nur in endlicher Zahl vorhanden. Das bedeutet, dass sich der Preis – ähnlich wie an der Börse – an Angebot und Nachfrage orientiert. Der Preis schwankt also. Es gibt jedoch einen momentanen Standardwert. Dieser liegt gerade zwischen 60€ und 90€ pro ausgestoßener Tonne CO₂. Unternehmen kaufen Zertifikate gemäß der geplanten Einkaufsaktivitäten ein und sind damit konform zur Richtlinie.

Eine Nichtbeachtung kommt für uns natürlich nicht in Frage, aber wir müssen uns diese Frage natürlich stellen. Werden keine oder nur eine ungenügende Anzahl an Zertifikaten eingekauft, ist mit Geldstrafen zu rechnen. Diese sind im Bereich von 10€ bis 50€ pro fehlendem Zertifikat. Die Geldstrafe ist jedoch vergleichsweise unbedeutend, denn tatsächlich werden Unternehmen, bei Nichtbeachtung der Richtlinie – direkt vom Handel im CBAM Bereich ausgeschlossen. Importierte Waren können dann nämlich den Zoll nicht passieren und stehen uns nicht zur Verfügung. Daraus entsteht natürlich Verzug in der Produktion, Auslieferungstermine verschieben sich, Arbeitspläne sind ungültig, und so weiter. Gegenüber den Geldstrafen ist das also die wesentlich größere Gefahr.

Question 5.6: Das letzte der drei Beispiele ist die EU-Taxonomie für nachhaltige Kapitalströme. Welche Auswirkung hat das auf die BMA? Hat das Sourcing in China Einfluss darauf?

³ FELDMANN, A. (2024). *Übergangsphase des EU CO₂ Grenzausgleichs (CBAM) hat begonnen*. ENGINEERING ASSOCIATION (online) <https://www.Engineering Association .org/viewer/-/v2article/render/93952939> [retrieved on 16.07.2024]

Grundsätzlich ist das ein Klassifikationssystem um nachhaltige Unternehmensaktivitäten zu identifizieren – wieder etabliert durch die Europäische Union. In anderen Worten geht es darum, Unternehmen eine Grundlage zu geben, damit diese nachhaltige Investitionen tätigen können. Genau wie die beiden anderen Verordnungen ist es auch Teil des European Green Deal. Das übergeordnete ist erneut die Auswirkungen des Klimawandels einzugrenzen. Damit eine Unternehmensaktivität als nachhaltig gilt, müssen verschiedene Kriterien erfüllt sein. Sie müssen mindestens zu einem der Klimaschutzziele erheblichen Beitrag leisten und darüber hinaus die anderen Ziele auch nicht schädigen. Erneut müssen Unternehmen ihre Aktivitäten veröffentlichen. Genau geht es darum, dass „grüne“ Umsatzerlöse gekennzeichnet und öffentlich wird. Verfolgen wir umweltschädliche Aktivitäten, wird sich dies dort niederschlagen. Ich schätze „Sourcing in China“ ist wohl nur schwer als umweltfreundliche Aktivität zu verkaufen – anders gesagt, einen positiven Einfluss hat es höchstwahrscheinlich nicht.

Question 5.7: Bei allen besprochenen Verordnungen ist „Sourcing in China“ wohl nicht zuträglich.

Wie groß schätzen Sie den Impact eines solchen Unternehmens generell ein?

Das kann ich nur sehr schwer einschätzen. Aber ich denke wohl, dass regional einzukaufen ist immer nachhaltiger und umweltfreundlicher als weiter weg, besonders wenn es um ein Land wie China geht. Um den halben Erdball einzukaufen benötigt immer enorme Ressourcen für den Transport. Dementsprechend denke ich, dass dieses Unternehmen keinesfalls einen positiven Beitrag leisten wird. Im Sinne unserer Nachhaltigkeitsstrategie ist es wohl nicht. Wir versuchen den „Total Product Footprint“ unserer Produkte zu reduzieren. Einkaufen über große Strecken treibt den Footprint dann wieder höher schätze ich. Und auch die Verordnungen legen natürlich großen Wert auf nachhaltige Unternehmensaktivitäten. Wir sind zum Berichten gezwungen und geben unseren Stakeholdern Einblicke in das was wir tun. Das könnte natürlich Einfluss auf unser Unternehmen haben. In welchem Ausmaß kann ich wie bereits gesagt nicht einschätzen.

Appendix 6. Interview Transcription with Interviewee 6

Interviewee Position: Production Engineer – also Field Correspondent for Asia

Dates: 30.04.2024, 10:30 – 11:30 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: German

Question 6.1: In meiner Arbeit untersuche Ich ob der Einkauf von Stahlbauteilen in China lohnenswert ist. Welche Chancen und Gefahren sehen Sie in einem solchen Unterfangen?

Asien ist natürlich ein vielversprechendes Ziel für Importe. Das haben wir – und auch andere große Firmen – schon früh bemerkt. Viele produzierende Firmen lassen in China fertigen und machen wenn überhaupt die Endmontage im eigenen Land. Gerade Verbraucherelektronik und Textilprodukte werden schon äußerst lange in Asien gefertigt. Wir haben die Vermutung, dass sich auch mit Stahlbauteilen gute Kostensenkungen erzielen lassen. Andere deutsche Maschinenbauer machen dies auch schon. Ich würde schätzen, dass Kostenvorteile von 20-30% realisierbar sind, teilweise sogar bis zu 50% – ohne Transportkosten und Einfuhrabgaben selbstverständlich. Das ist natürlich sehr verlockend aber es ist nur eine Seite der Medaille. Auf der anderen Seite ist China natürlich ein völlig anderer Markt mit ganz anderen Eigenschaften. Momentan ist wohl die unsichere Lage mit Taiwan eine Gefahr für Lieferketten. Welche Wahrscheinlichkeit oder Auswirkungen ein gewaltsamer Konflikt hat, kann ich jedoch nicht genau einschätzen.

Question 6.2: Sie haben Erfahrung mit sowohl deutschen als auch chinesischen Lieferanten. Welche Unterschiede nehmen Sie wahr?

Generell ist das Vorgehen bei deutschen und chinesischen Lieferanten das gleiche. Nichtsdestotrotz gibt es bei chinesischen Lieferanten natürlich einiges zu beachten. Momentan sind die Englischkenntnisse in China noch lückenhaft. Es kann also nicht davon ausgegangen werden, dass deutsche Einkäufer und chinesische Lieferanten eine gemeinsame Sprache besitzen. Das ist im Werk Tianjin einfacher, da im dortigen Einkaufsteam viele chinesische Kollegen sitzen. Wenn ich mit den lokalen Lieferanten zu tun habe, benötigen wir jedoch stets einen Übersetzer. Das erschwert natürlich das Vorgehen. Das bedeutet natürlich mehr Arbeitsaufwand – und generell würde ich schätzen, dass – wenn man die Einkaufsaktivitäten verlagert – der administrative Aufwand zunimmt. Es ist einfach aufwändiger die Lieferantenbeziehungen im Ausland zu pflegen, als auf nationaler oder europäischer Ebene. Wenn man über den halben Erdball einkauft, kommt zudem ein Zeitverzug hinzu. Das erschwert natürlich die Produktionsplanung und auch die

Lagerhaltung. Die Produktionsplanung möchte natürlich, dass Materialien schnell verfügbar sind. Die Arbeitsvorbereitung legt den Bedarf für die Produktion fest und ein Material soll dann so schnell wie möglich ausgelagert werden können. Die Lagerhaltung hat ähnliche Anforderungen. Meiner Einschätzung sind die reinen Transportzeiten im Moment etwa zwischen zwei Wochen und zwei Monaten – generell aber ungefähr ein Monat. Zusätzliche Zeit führt natürlich zu größerer Planungsunsicherheit. Abschließend würde ich behaupten, dass Einkaufen im Ausland immer mit zusätzlichen Hürden verbunden ist – hat natürlich aber Vorteile auf anderen Ebenen.

Question 6.3: Die Bezeichnung „Made in China“ wird oft in Verbindung mit minderer Qualität gebracht. Gleichzeitig positioniert sich BMA als Qualitätsführer. Wie stehen Sie zu dieser Folgerung und wie könnte sich dies auf das Unternehmen auswirken?

Das ist eine allseits bekannte Behauptung und hat sich wohl daraus entwickelt, dass eben Unternehmen, die sich nicht als Qualitätsführer positionieren – sondern als Kostenführer – eben auch in China produzieren lassen. Kostenführer sind an möglichst hohem Marktanteil mit möglichst niedrigen Kosten interessiert. Qualität ist – gegenüber der Kosteneinsparung – demnach zweitrangig. Die niedrigen Lohnkosten in China sorgen für diese Einsparungen wobei auf Qualität weniger gesetzt wird. Daher hat sich wohl dieses Stigma entwickelt. Tatsächlich denke ich jedoch, dass Qualität auch in China zu finden ist. Meiner Einschätzung nach sind chinesische Lieferanten auf einem sehr guten Niveau, und nachdem bei Bauer weltweit die gleichen Maßnahmen zur Qualitätskontrolle und Wareneingangsprüfung verwendet werden, haben alle Produkte – wo auch immer sie herkommen – die gleichen Anforderungen zu erfüllen. Ich würde schätzen, dass die Produkte chinesischer Lieferanten mittlerweile nur noch wenig hinter den deutschen liegen. Qualität hat in China mittlerweile mehr Gewicht als es von einigen Jahrzehnten der Fall war.

Question 6.4: Wie sehen Sie den Status von Bauer in der Industrie? Ist es als Sondermaschinenbauer schwieriger am Markt zu agieren?

Das denke ich durchaus. Wir legen, wie gesagt, viel Wert auf Qualität und haben auch entsprechend teure Produkte. Unsere Verkaufszahlen als auch Einkaufszahlen liegen deutlich unter dem Branchendurchschnitt. Firmen wie beispielsweise Lieber fertigen ihre Produkte in viel höheren Auflagen und haben auch ein größeres Produktportfolio. Lieferanten präferieren natürlich Kunden mit großen Einkaufsvolumen – und da ziehen wir natürlich den Kürzeren. Dem halten wir entgegen, da wir gute Beziehungen mit unseren Partnern haben. Wir gewinnen auch an Verhandlungsmacht, weil wir Spezialprodukte anbieten. Das verhilft uns zu einem Alleinstellungsmerkmal.

Appendix 7. Interview Transcription with Interviewee 7

Interviewee Position: Chief Buyer at Production Plant in Tianjin, China

Dates: 18.04.2024, 09:00 – 10:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: English

Question 7.1: My research has shown that business in China is highly attractive for German companies. I research if sourcing steel parts in China for our German production is worthwhile. What are your thoughts on this topic?

Steel parts are one of the most important parts of machine production. Here at Bauer [refers to “Bauer Tianjin Technologies Co., Ltd.”] I would guess steel parts make up about 30% of total cost, so decreasing the cost is favourable. Many companies already took the opportunity and relocated their steel parts to Asia. We have many competitors from foreign countries that produce in China, such as Caterpillar from USA and Liebherr from Germany. I see that quality is rising in China and here [in Tianjin] we do not have significant problems with our local suppliers. We get support from Schrobhausen and can produce high-quality machinery that fits the Bauer standard. I can see that purchasing [steel parts] for Germany is a good decision.

Question 7.2: What Opportunities and Threats can you think of when relocating our sourcing activities to China?

As I said before, since steel parts make up a major part of the costs, we could realise good cost savings in China. Many companies already import their parts from China, because they saw the opportunity to save money. Also, I saw that recent events – such as the war in Russian and Ukraine – gave more importance to China. Generally speaking, having a good supplier base is always better than relying only to a few suppliers. So China could serve as a good opportunity to diversify the supplier base. Not only that, but also Bauer tries to have close relationships with suppliers and customers. So instead of only taking the best-cost supplier we want to have quality relationships – even if it means that we pay more first. Having good relationships pays off in the long term. Also, speaking of quality, as I said before, the quality in China increases very fast. Companies around the world, not only machine producers, manufacture in China and are very satisfied with the results. Of course the competition is high right now. Not only do we have international companies, but we also have local Chinese companies that are very powerful. Also, some companies, such as XCMG are state owned. They are way bigger than Bauer and serve a huge customer base.

Question 7.3: You mentioned close, quality relationships are favoured over simply going for the best-cost supplier available. Can you elaborate on that matter?

Yes, as I said, here in China we have big competition. I would say that we need good supplier relationships to make up for our low ordering volumes. Bauer is a quality company that needs quality business partners. So I would argue that it is part of our quality thought to really focus on suppliers rather than taking the best-cost option. In my eyes the best option would be to enter strategic agreements or partnerships to really strengthen the customer-supplier relationship.

Question 7.4: You mentioned Strategic Agreements and Partnerships. Can you elaborate on that? How could BMA take advantage of this and what are the downsides?

Yes of course. A traditional supplier relationship consists of buying and receiving goods without interactions that do not belong to the original transaction. The strategic agreement would include a long-term relationship that focuses on topics outside of simply buying and receiving. This usually means to shape common scopes and objectives, communication on a regular basis, adjust delivery and pricing terms. It is normally part of the company's contingency plan and risk management. For further input I would consult recent publications and benchmarks of other companies. As we cleared before, Bauer keeps close relationships and this means that we already have some partnerships with suppliers. We are in regular contact, visit supplier sites and have designated contact persons – of course only for selected suppliers. It would probably be too much work to keep this relationship with every single supplier, especially with those that are not critical. My recommendation would therefore be to intensify the relationship with suppliers that have a critical impact on the supply chain. We should not risk to have breaches in those fields.

Appendix 8. Interview Transcription with Interviewee 8

Interviewee Position: Purchasing Foreman at Bauer Engineering India Private Limited

Dates: 29.04.2024, 14:00 – 15:00 (UTC+3)

Location: Meeting via Microsoft Teams

Language of Conversation: English

Question 8.1: My research has shown that companies began to establish subsidiaries in India. What are your general thoughts on India's economy, Business activities and foreign relations?

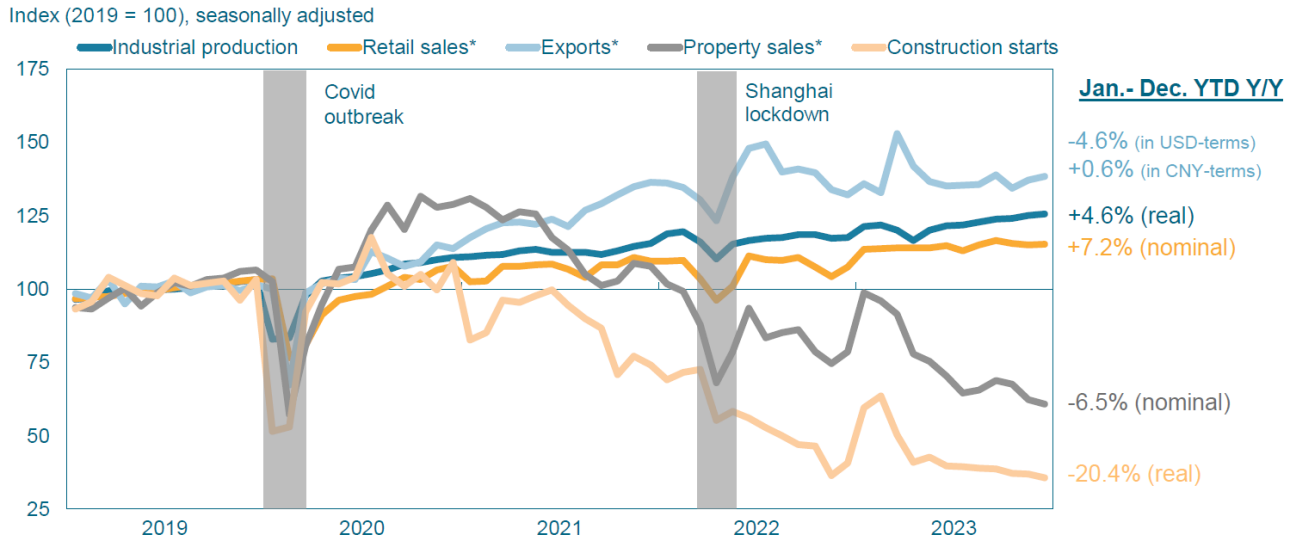
Absolutely. India grows as a very good option for investment. The economic conditions are comparatively good and the GDP goes up. This means that more and more foreign companies – also from Germany – invest in India. India's economy becomes therefore more attractive over time. Also, India invests a lot into infrastructure and its poorer regions. It leads to India becoming a more stable and dependable country for business relationships. Generally speaking, India also maintains good relationships with other countries – except for two: Pakistan and China.

Question 8.2: The topic of my work is sourcing in China. A ENGINEERING ASSOCIATION study [shows Figure 2] shows that steel prices in China are significantly below the European and American average. The same applies to India. Do you think that similar research is also worthwhile for India?

Master Thesis have a specific scope and China is a big country, so is India. If the Master Thesis for China shows a good result, the same can be done for India. The statistic [refers to Figure 2] shows low steel prices for India and this is a development I can understand. Prices in India are generally lower than Europe of course. I can image in that steel prices are also decreased. Of course not only prices are important for the decision. Also the environment and the logistics must be considered. I think that India favours business with German companies. The level of English is very good in India when compared to other countries. English gets taught in school and even Indian people communicate often in English, since we have so many different languages in India.

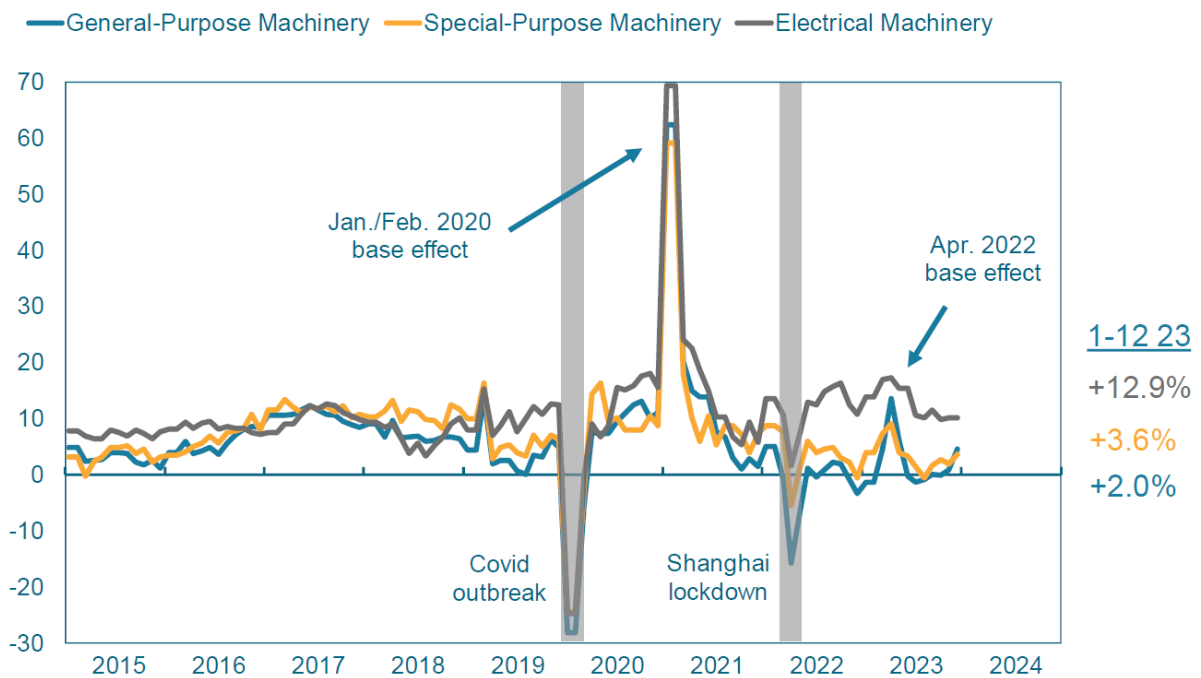
Appendix 9. ENGINEERING ASSOCIATION Statistics

Macroeconomic Development in China, 2024

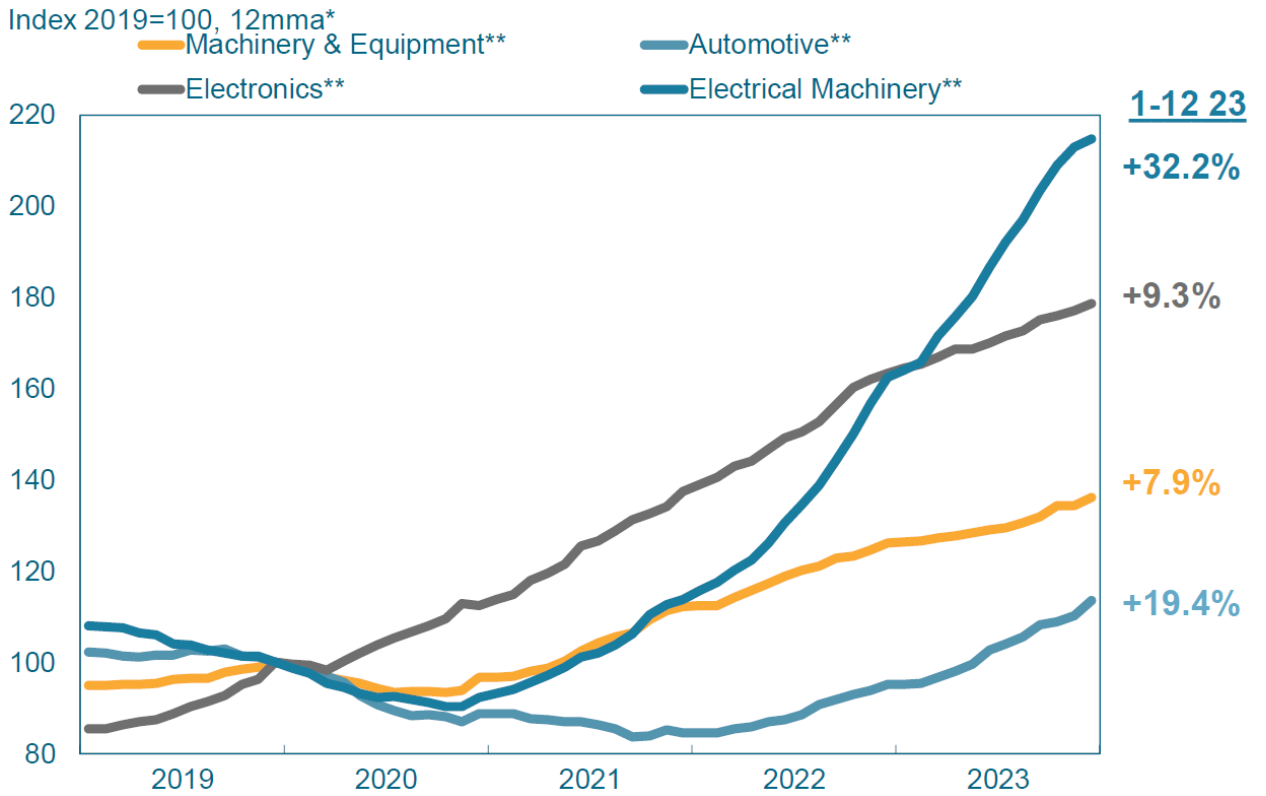


Production of Machinery & Equipment and Electrical Machinery, 2024

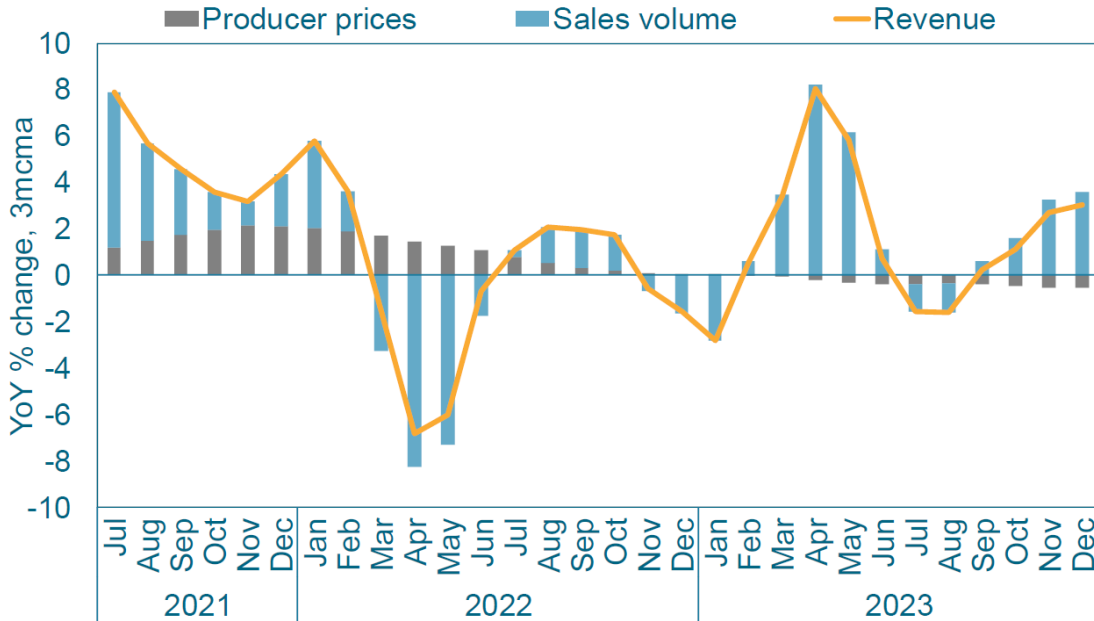
real value-added production
% change on a year earlier



Investment by Selected Industrial Sectors, 2024

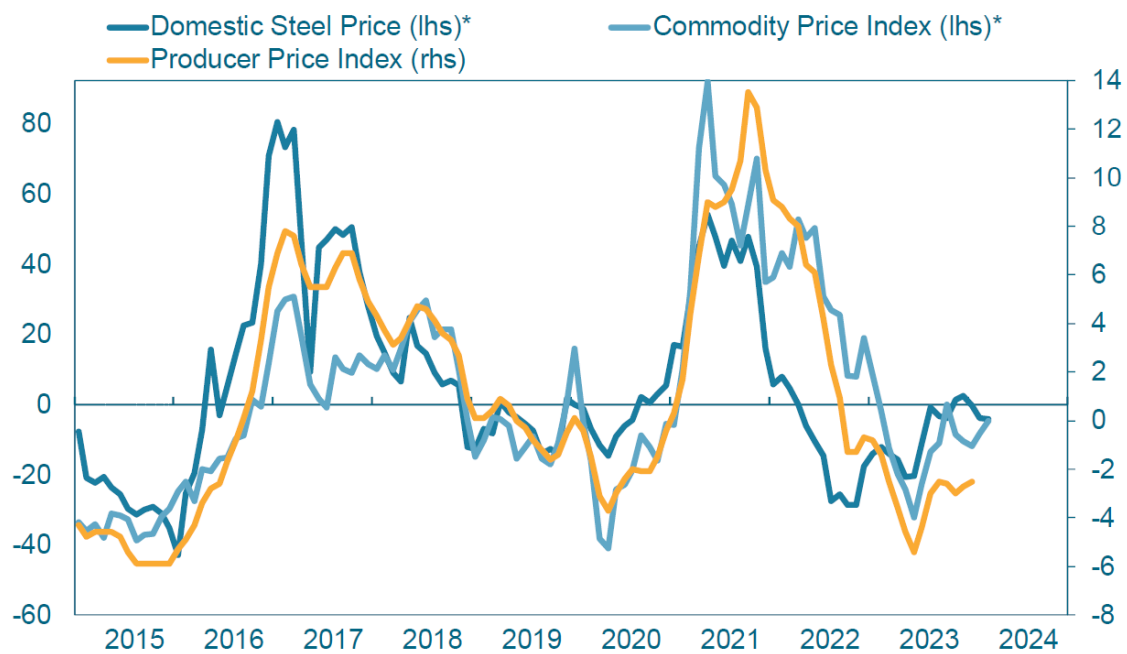


Revenue Change broken into Volume and Price Components, 2024



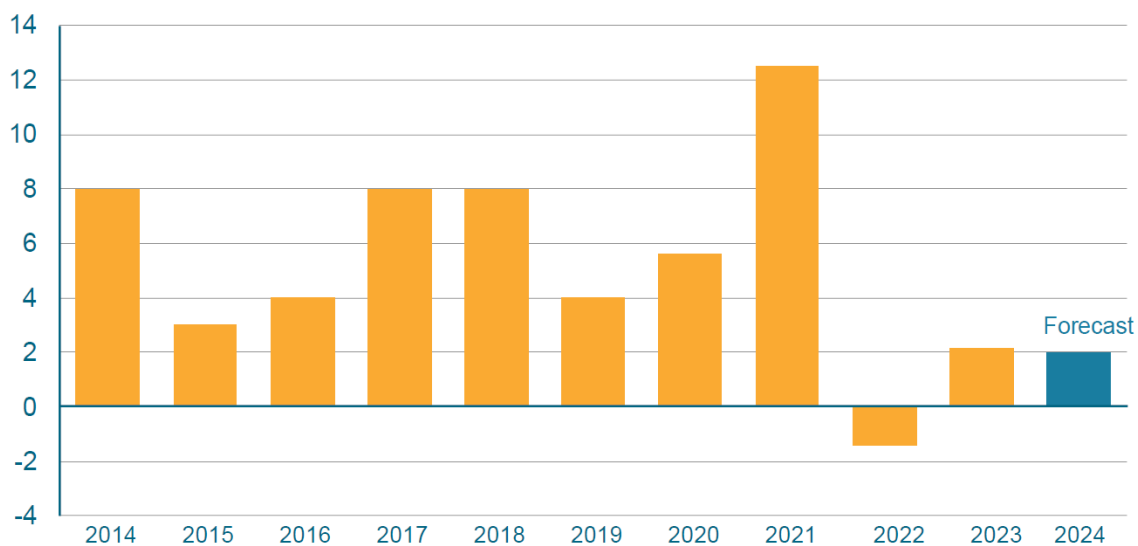
Commodity Prices, Producer Price Index and Industrial Profits, 2024

% change on a year earlier



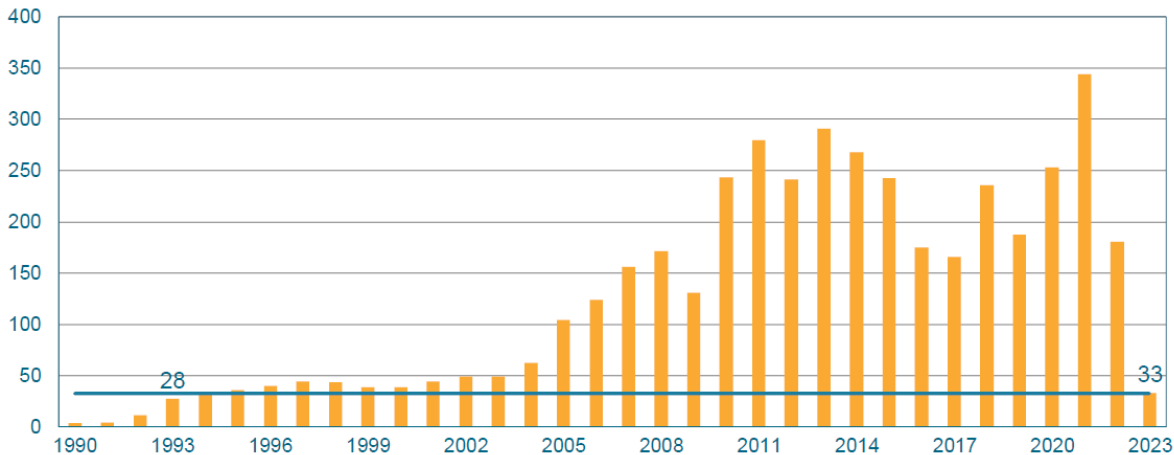
Forecast Update: Machinery & Equipment Sector in China

% change on a year earlier, price-adjusted



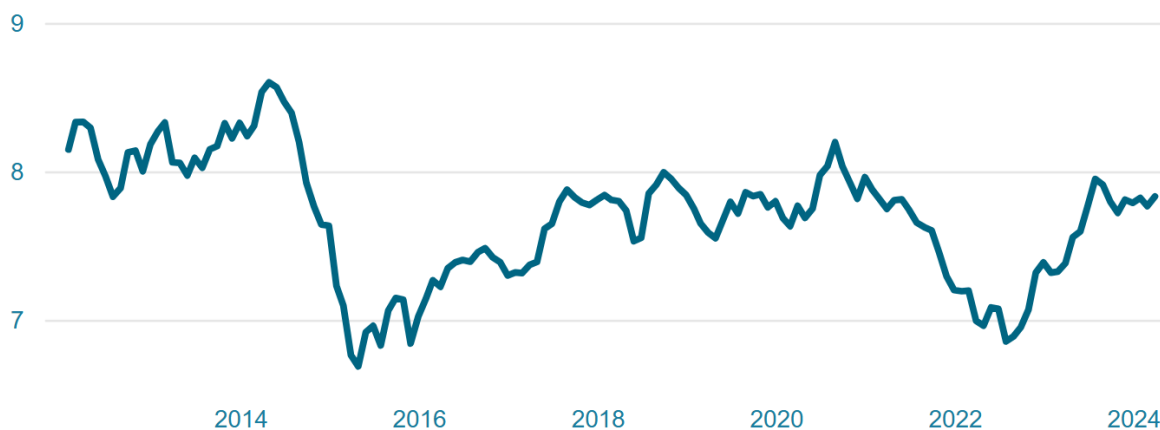
Foreign Direct Investment Inflow into China

Foreign direct investment inflows into China
in billion USD



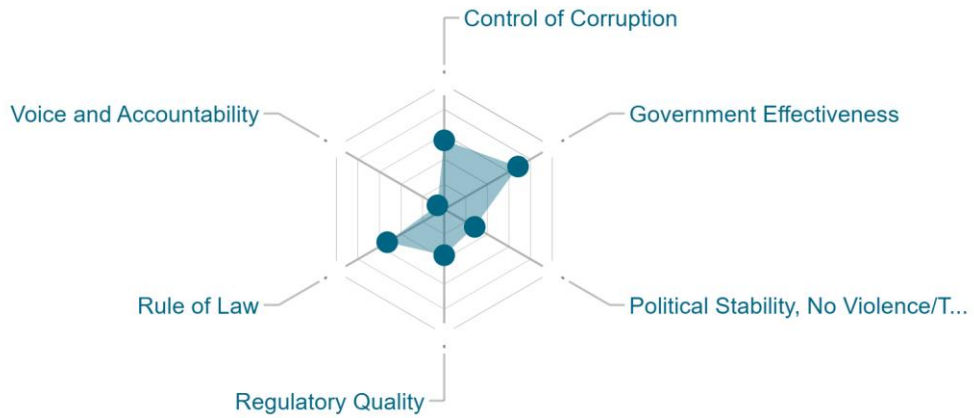
Chinese Yuan Renminbi per Euro from 2013 to 2024 (Q1)

ECB Euro reference rate, monthly average (CNY per EUR)



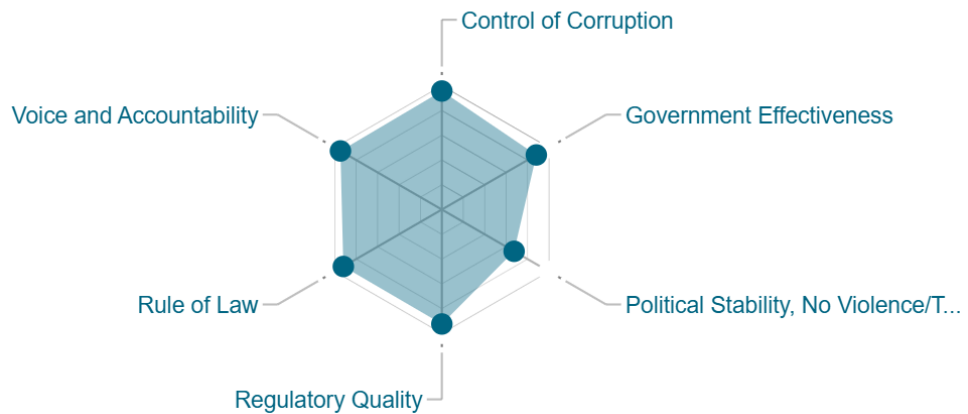
Worldbank Worldwide Governance Indicators China, 2022

Worldwide Governance Indicators



Worldbank Worldwide Governance Indicators Germany, 2022

Worldwide Governance Indicators

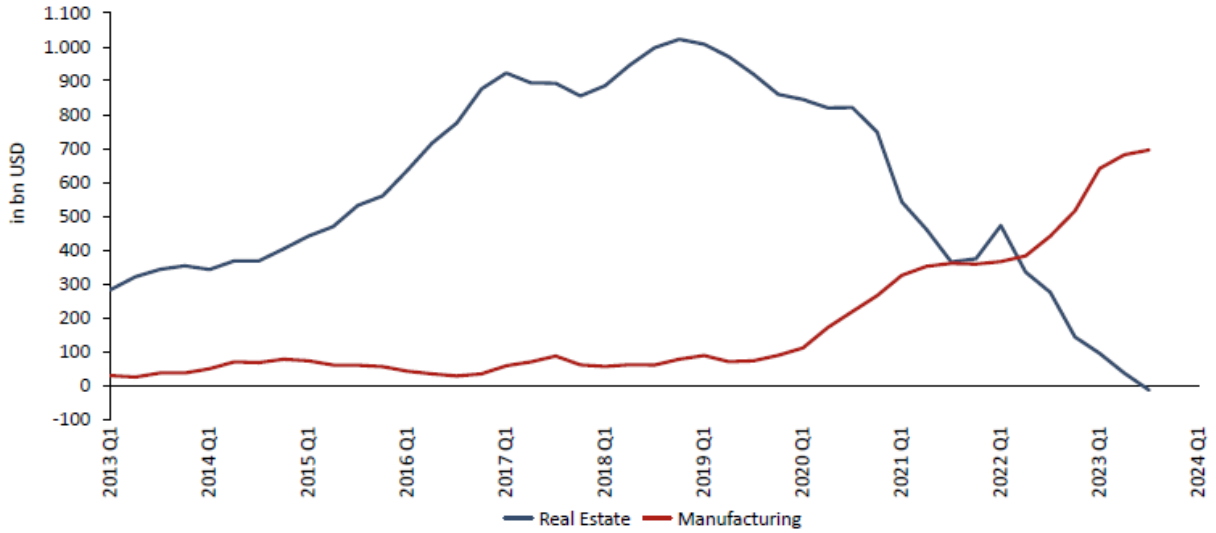


Year of Establishment of legal Entities between 1986 and 2023



Appendix 10. Engineering Association Subsidiary Statistics

Expansion of Total Bank Loans 2013 – 2023 Q3

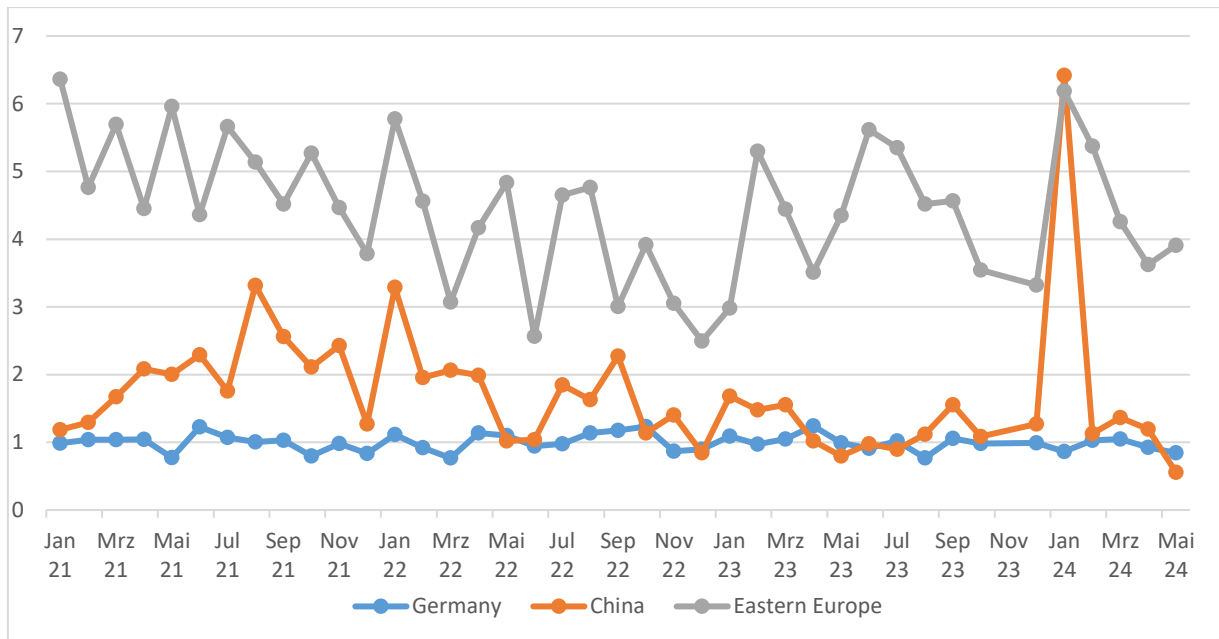


Risk and Security Needs have constantly risen during past three Decades

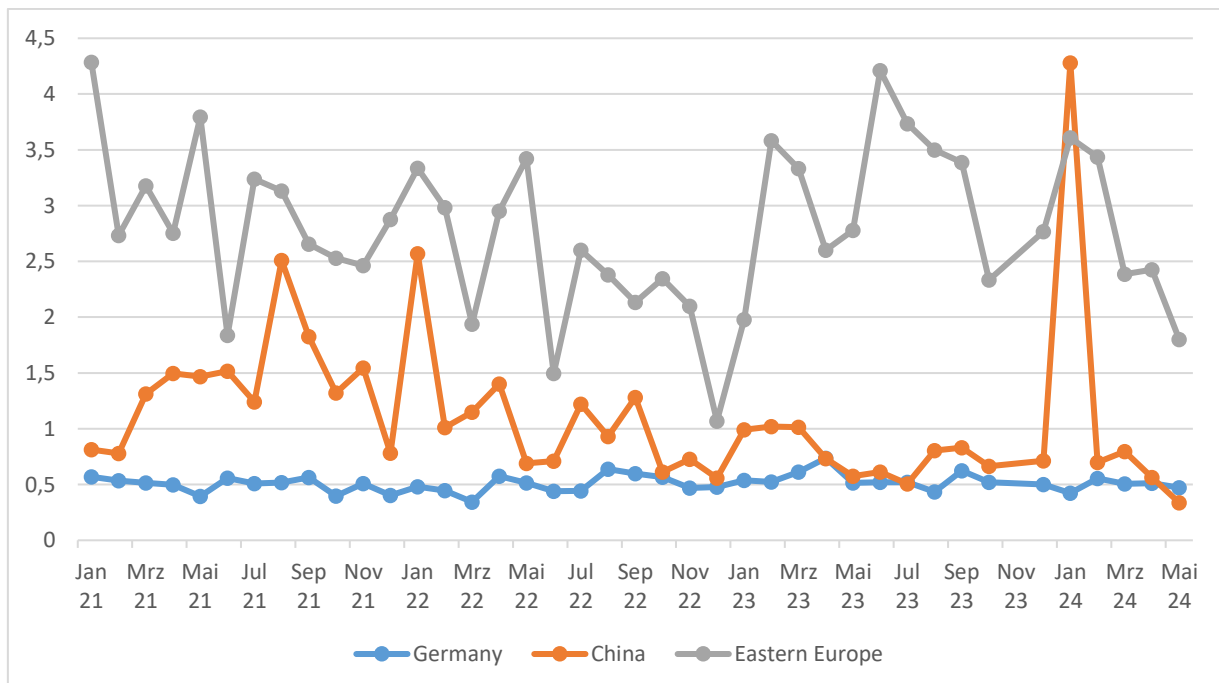


Appendix 11. Quality Analysis

Defect Rate (not weighted)



Defect Rate (weighted)



Appendix 12. Complete SWOT-Analysis

Category	No.	Short Description	Sources	Triangulated
<i>Strengths</i>	S1	Positioned as Quality Leader in the Market	Interviewee 3, Bauer Employee 3,	Yes
	S2	Established Supplier Network in Asia	Interviewee 7, Interviewee 6,	Yes
	S3	Established Production and Distribution Facilities for native Support	Interviewee 4, Interviewee 6,	Yes
	S4	Close Supplier Relationships overall	Interviewee 3, Interviewee 6	Yes
<i>Weaknesses</i>	W1	Product Portfolio in upper price segment/Above industry average cost structure	Interviewee 3, Bauer Employee 3,	Yes
	W2	Low order volumes for suppliers/reduced negotiating power in competition	Interviewee 7, Interviewee 3	Yes
	W3	Additional administrative work for remote locations	Interviewee 7, Interviewee 3	Partly
<i>Opportunities</i>	O1	Cost Saving Potential China	Interviewee 3, Interviewee 2, Inter-	Yes
	O2	Favourable Economic Conditions and Trade Policies for foreign Investment	Interviewee 2, Interviewee 1, Inter-	Yes
	O3	Diversified Supplier Base/Wide Range & Availability for more Options	Interviewee 7, Interviewee 2,	Yes
	O4	Possibility of Partnership/Strategic Agreements	Interviewee 7, Interviewee 2,	Yes
<i>Threats</i>	T1	Threats to supply chain stability due to geopolitical instability	Interviewee 1, Interviewee 2,	Yes
	T2	Impairment of the sustainability strategy/Ethical Standards	Interviewee 3, Interviewee 5, UHB	Yes
	T3	Increased Lead Time/Logistical Challenges	Interviewee 7, Barkowsky	Partly
	T4	Issues due to Legal and Regulatory Compliance	Interviewee 2, Interviewee 5,	Yes
	T5	Access/Maintenance of Supplier Relationships in foreign Environments	Barkowsky, Interviewee 7	Partly
	T6	Cultural and Language Barriers	Interviewee 2, ENGINEERING	Yes
	T7	Currency Volatility/Fluctuations	Interviewee 1, Interviewee 2,	Yes
	T8	Product Quality Fluctuations/ Supplier Reliability	Interviewee 3, Interviewee 6, Inter-	Yes
	T9	Changed customer reactions due to changed sourcing strategy	Interviewee 3, Interviewee 6,	Yes

Appendix 13. Complete QSPM-Analysis

Decision Category	Weight (Categ.)	SWOT-Factor	No.	Decision Criteria	Weight (Single)	Weight (Criteria)	Expansion		Catch-Up	Safe-guarding		Avoidance		
							3	0,675		3	0,675	2	0,45	
Strategy	45%	S1, S4, T2, T8, T9	1	Influence on Strategic Alignment (Position)	50%	22,5%	3	0,675	5	1,125	3	0,675	2	0,45
							9	2,025	7	1,575	3	0,675	0	0
Logistics	40%	S2, S3, W2, O3, O4, T1, T3, T8	3	Influence on Supply Chain Resilience	60%	24%	1	0,24	3	0,72	9	2,16	6	1,44
							2	0,16	4	0,32	8	0,64	10	0,8
Relationship	15%	S2, S3, S4, O4, T1, T5, T6, T8	5	Influence on Administrative Work	20%	8%	1	0,08	3	0,24	6	0,48	7	0,56
							2	0,09	4	0,18	7	0,315	7	0,315
Σ	100%	S3, W3, O3, O4, T5, T6, T8	7	Influence on Customer Relationship/Company Image	70%	10,5%	3	0,315	5	0,525	8	0,84	6	0,63
							3,585	4,685	5,785	4,195				

Appendix 14. Evaluation Criteria

Reliability

No.	Criteria	Fulfilled?
1	The status of the researcher is disclosed and explained	Yes
2	The choice of informants/participants and their profession are stated	Yes
3	The social/professional situation is thoroughly disclosed and explained	Yes
4	All Analytic constructs, main terms, definitions, units of analysis and premises are disclosed	Yes
5	Methods of data collection, analysis and procedures are explicitly explained	Yes
6	Low-Interference Description/Non-judgmental data collection	Yes*
7	Multiple Researchers/Participant researchers work on the Research Question	Partly
8	Peer Examination is present	Yes
9	Data is recorded mechanically	Yes

Validity

No.	Criteria	Fulfilled?
1	Triangulation is used to resolve ambiguity	Yes
2	Member Checks have taken place	Partly
3	Long-term observation has taken place	No
4	Peer Examination is present	Yes
5	Participatory or collaborative modes of research apply	Yes
6	Avoidance of researcher bias	Partly

Declaration of Originality

"I hereby declare that I have written this thesis independently, have not submitted it elsewhere for examination purposes, have not used any sources and aids other than those specified and have marked verbatim and analogous quotations as such."

A handwritten signature in blue ink that reads "Ferdinand Coloe". The signature is written in a cursive style with a large initial 'F'.

Place, Date, Signature