Key success factors of engineering company (Case of Czech engineering industry)*

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Abstract

The definition of a successful company is not uniform in the scientific literature, and the determinants of a company's success can vary from one business sector to another. Based on a study of 16 Czech engineering companies, this paper defines the success of an engineering company as a state when the company achieves the satisfaction and stability of external and internal interest groups (especially employees), contributing to its healthy development, technological expansion and long-term sustainability through marketable products or services and sufficient resources to finance that state. This definition is consistent with the results of studies such as Fortune and White (2006), Zarina et al. (2014), Arcić (2018), Mahanti (2018) or Amuda-Yusuf (2018). In the Czech engineering environment, marketing can generally be considered a key factor, and within the marketing mix, pricing policy and especially product. The breadth and depth of the products provided and their high quality also play a significant role. Furthermore, human resources are a key factor in the success of the Czech engineering company, where the emphasis is placed on the stability and loyalty of employees and their positive attitude to work, and research, development and innovation are mentioned as another key success factor. Surprisingly, financial factors were not listed as the main determinants of success.

Keywords: Engineering company, successful company, success, key factors of success, determinants of success
JEL Codes: M20, M21

Introduction

Mechanical engineering is a business sector that plays a crucial role in many European national economies. The Czech Republic has long been at the top of the European ranking of countries in terms of the share of industry in GDP – in 2017 it was 33.5 percent. Engineering is one of the fastest growing industries, but already in 2019 a number of engineering companies experienced a slowdown in growth and the most progressive in this context realized the urgent need for faster implementation of automation and robotics. In order for Czech engineering firms to succeed in the market and maintain their position in European and global competition, it is important to define the key success factors of these firms. Is it merely an implementation of Industry 4.0 principles, consisting of the digitization of the entire process that is currently being discussed most, or are

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other factors determined by the success of Czech engineering companies? For this reason, it is also important for the Czech economy that companies operating in the engineering sector are successful. Discussion of the concept of "company success" has been going on for decades. It is necessary to realize that a number of factors influence the success of a company and its definition. Even though scientific literature contains a large number of opinions, findings, attitudes, and business models of success, it is difficult to establish a single path for identifying key success factors. The actual definition of "success" and "successful enterprise" is difficult, it is not possible to clearly and generally determine the point at which an enterprise can be considered successful in its activity and where the enterprise does not achieve success. One of the ways to identify and define success is the method of identifying the factors that influence it, this being the so-called key success factors. Key success factors can be found not only in the financial area but also in the non-financial sphere. It is necessary to ensure the success of a company not only externally, but also inside the company, i.e., to meet the requirements for achieving the set goals and results of all interest groups. However, defining specific key factors that will ensure success for all companies is difficult because the success of a company depends on its goals, as well as the goals set by individual interests, the company's capabilities, and what it actually seeks to achieve. Key sources of success are primarily sought within a company, mainly in its operational activities.

This paper aims to define a "successful company" in the engineering business sector, as viewed by Czech engineering companies and further, based on primary data collection, to identify subjectively perceived key success factors of engineering companies in the Czech Republic.

Literature review

Business success has been the focus of a large number of studies, and it has generated many theories. Still, it is difficult to grasp and define this concept, as the ideas of the authors regarding company success differ, and in some cases, they are even contradictory. Weinzimmer and Manmadhan (2009) state that there are many ways to define the success of a business or a successful business, the definition of the concept of business success differs, according to Masu (2001), whether a business is successful can be determined on the basis of economic and financial measures, such as return on assets, sales, profits, sales growth, employee turnover and productivity, organizational structure or survival rate in a market that satisfies the business; Weinzimmer and Manmadhan (2009) argue that management innovations are an important factor in the success of a business; the other authors accentuate the internal factors of business success, e.g. (O'Farell/Hitchens/Moffat 1992), (Man/Lau/Chana 2002), (Häuser 2004), (Wijewardena/Zoysa 2005) or (Al-Mahrouq 2010).

In general, approaches to looking at business success can be divided into two groups: those that measure business success primarily by financial indicators and those that include non-financial indicators. According to Pticar (2016), when optimizing the financial structure, it is suitable to focus primarily on the ratio of the size and structure of assets and the structure of equity and debt. It is important to establish a ratio that guarantees long-term prosperity. However, Tichá and Hron (2016) argue that a company can reach success also by projecting a good image, finding the right location, having disposable financial capital, or in the polite behaviour of employees. According to Cowling (2007) some companies consider mere survival in their market as a success while others may see it in achieving a certain market share (Cowling 2007). Masu (2001) states that the success of a company can be determined by looking at economic and financial measures, such as return on assets, sales, profits, revenue growth, employee turnover and productivity, organizational structure or survival rates in the market where the company operates. Further measures include customer satisfaction and company development, which can be measured, for example, by its financial growth or export volumes.

The emergence and implementation of non-financial success indicators is linked to attempts to identify critical and key business success factors. (Peters and Watermann 1993; Chung 1987 et al.) However, the accentuation of non-financial indicators in assessing the success of enterprises prevails in current literature. Johnson and Kaplan (1991) have already emphasized in their work the failure of financial indicators to assess performance because of changes in the business environment and in the strategies of modern businesses. More important than measuring profit is, according to these authors, the measurement and reporting of non-financial indicators. These should be based on the organization's strategy and concern in particular production, marketing, research and development. Focusing on the conditions of Czech companies Vodáček, Vodáčková (2004), published a model of critical success factors, which include, in particular, internal environment factors such as strategy, leaders, structure, staff, IS / IT, and processes. Leidcker and Bruno (1984) view key factors of company success as variables that, when properly maintained and managed, have a significant impact on the successful operation of a business in the competitive struggle within a given business sector; Milosevic and Patanakul (2005) share this view. According to Veber (2011), potential success areas can be found in the value chain. The first area is the customer as a source of success. Here it is important to pay attention to the value perceived by the customer, measuring customer performance, and developing their potential. Key indicators include positions in a customer portfolio, benefits from key customers, transaction costs, and development potential. Another area is products, where we examine the performance of products, which we further measure, and product development potential. Key indicators include, for example, individual product effectiveness, the prediction of this effective-

ness, the product's market share, or the technical level of products. The last area is the operational activity mentioned earlier. Here we focus on measuring and improving process performance and developing their potential. Based on historical research and studies (e.g., Chua et al. 1999; Fortune and White 2006; Zarina et al. 2014), the pivotal areas of business success that we recognize include senior management support, qualified project managers, designers and development staff, project team motivation, systematic troubleshooting, adequate communication channels, efficient control, design and construction planning, communication feedback efficiency, or a sufficient financial budget for business operations. The key success factors are sector-specific and affect the competitiveness of individual companies. They must use skills or prerequisites that are essential for achieving success (Tichá and Hron 2016).

According to Man, Lau and Chan (2002), Dedouchová (2001) or Zuzák (2011), the success of a company is determined primarily by the selection and correct specification of strategies, but also by a well-chosen organizational structure and the company operations management system. However, it is impossible to point out which of these combinations of resources is a sure-fire way to success, as each strategy brings about different or even opposite demands for organizational structures and their management systems. Kislingerová and Nový (2005) emphasize the importance of having a clear idea where a company's business should be going. It is, therefore, crucial to set goals and strategies to achieve them. Partial objectives must also be consistent with the main company objectives and must be linked to important business activities. According to Keller and Richey (2006), success in a competition can also be affected by customers' perception, business reputation, or company image. No company should neglect corporate branding and proper care of its brand personality. The features and values of the company's brand are determined by its employees' behaviour and personal qualities. That is why a company brand must be managed and cared for, which is crucial to market success. Abrams (2014) notes that a well-designed business plan plays a vital role in a well-functioning company. Before starting the process of creating a business plan, it is necessary to know the primary factors that have a significant impact on a successful business. These include a business concept, familiarity with the market, understanding industry trends and its condition, consistent business focus and a clear strategic position, management with the ability to attract, motivate and retain employees, financial control, the ability to anticipate and adapt to changes as well as company values and integrity. Mullins and Komisar (2010) also see the business plan as the key to a successful company.

Dedouchová (2001) states that the success of a company may also depend on its ability to utilize and point out its uniqueness effectively and correctly. It is possible to achieve a strong competitive market position if the art of developing company strengths is skilfully employed. Whether a company is able to obtain suffi-

cient financial resources for its development plays a significant role here. It is imperative to keep this market position through innovations. As the globalization of markets continues to increase competition, companies have to be very creative in finding ways to improve performance and success. One of the ways to boost competitiveness is, according to Fibitz and Ulrich (2018), the innovation mentioned above. Innovations can be introduced, for example, into the business model, where we create new business activities or define new approaches to the already existing and established operations. Key success factors for innovations include knowledge and capability management, capacity and resources, the flexibility of organizational structure, risk perception, or collaboration.

According to Richardson (1992), a company's negotiation skills are critical in ensuring its success. She states that successful negotiation is "a skill that can be learned and refined". When a company enters into negotiations, it assumes that its claims will be met without changes. Only a good negotiator is ready to both make and accept proposals. A company may engage in negotiations when communicating with both business partners and customers themselves. A successful company must, therefore, have the ability to negotiate changes to its proposals so that both parties can be winners, i.e., the so-called win-win agreement. Such a company must understand the other party's needs and be willing to compromise to meet their needs. Tarricone and Luca (2002) state that company success can also be influenced by the degree of employee engagement in individual internal processes. Emphasis is placed on ensuring that employees not merely work but are valuable and contribute to business success. This involves above all the efficient and positive development of a company through the use of professional skills and knowledge. Team culture as established by a company, together with mutual social dependence and teamwork also have an impact with emphasis on effective collaboration within teams.

It would be difficult to find a universal methodology in scientific literature to determine what a company should do to be successful. According to Veber (2011), it is up to managers to choose the most suitable methods, procedures, and tools based on the conditions in the company's environment so as to achieve success. Thanks to globalization, the ground for a successful company can also be found in international trade, especially in the engineering industry, which has for a long time been a prosperous and traditional business sector in the Czech Republic with a significant share in the country's export. The primary motivation for doing business on an international scale is the need to increase sales, expanding the customer portfolio, expanding the scope of activities, better business conditions, or the existence of demand from abroad. A survey by Kubíčková and Marková (2011) has found a positive correlation between a company's successful international trading and its size and also the fact that for successful foreign trading it is vital to enter the market within five years of a company's establishment. The survey also found that direct export is the prevalent form of interna-

tional trading. Engineering companies have to adapt their marketing activities to foreign markets, especially its product and price. Whether a company succeeds in international markets is also determined by its ability to adapt to this environment. According to Kubíčková, Toulová, Votoupalová (2015), the most successful companies are those that maintain or increase their market share with the help of pricing policy while in the long term it is crucial that companies invest in research and development. Key factors include, but are not limited to, product quality, flexibility and adaptability, competitive advantage, or company brand and image. Hamel and Breen (2008) argue that management innovations constitute a major factor in the success of a company. While the importance of innovations in production and product processes cannot be underestimated, innovations in management are equally important. Hamel and Breen (2008) also note that what holds back the further development of a company and its chances of success is the company management model. Milichovský (2017) says that, particularly in the engineering industry, it is essential for future success to model individual elements of the marketing mix accurately. Research shows that the choice of prices, channels of communication, and product policy depends on the size of a company, whereas the size does not affect the choice of distribution channels. All marketing activities depend mainly on the product, while research and development are also important components. An appropriate distribution policy, and in particular its flexibility towards customers, has a considerable impact on efficiency and increases the competitiveness of engineering companies. O'Farell, Hitchens and Moffat (1992) have also focused on price, quality, design and marketing in studying business success; Hammer (2012) believes that the success of a company is attributable to the fact that the entire business economics and company operation revolve around the customer. This means that businesses need to adapt to their customers and focus on what they want. All processes must be put in first place in company management, and a company must create satisfactory conditions for their high performance. Hammer also emphasizes the creation of distribution channels as a community and cooperation. Other significant factors include smooth communication between the customer and a company, anticipating customers' needs, and most of all, allowing the customer to be involved in company processes to make him feel special. Other authors, e.g., Fortune and White (2006) or Weinzimmer and Manmadhan (2009), point out that the success of a company can take many forms, the fulfilment and significance of which varies for different stakeholders and interest groups. For every business, success lies in something else. These can be, for example, a successful return on investment, an increase in a company's market share, the success of a company's survival in the market, or success in achieving the same results its competitors boast about. This means that success has a different meaning for each interest group.

According to Fortune and White (2006), the key success factors of company projects include the support of top management, the structure of set goals, and the project plan and its detail. Arcić (2018) also agrees with this and adds that, in addition to examining individual managerial roles and institutional support, it is necessary to create a functioning project management model, which should be a company's primary purpose. Support processes must be accurately defined during the design and implementation of a project and its plan with regard to customer requirements so that the value of this model is as effective as possible. Projects concerning information technology also play a vital role.

Man, Lau and Chan (2002) notice that it is possible to distinguish three basic aspects leading to business success, which include internal factors of the company, external factors (external framework conditions) and unique influence (personality) of the entrepreneur. These factors then affect the performance of the company. However, it should be noted that these authors dealt with small and medium-sized businesses in their research

Human resources are a frequently cited key success factor for businesses, as reported by Rose, Kumar and Yen (2006), Al-Mahrouq (2010) or Lin (1998). It should be noted, however, that these studies do not deal solely with engineering companies. Wijewarden and Zoysa (2005) also focused on SMEs, who in their research defined a set of six individual factors that have a positive and significant impact on the success of SMEs. These factors include customer orientation, product quality, management efficiency, supportive environment, marketing strategy and capital availability. Similar conclusions have also been made by Chittithaworn et al. (2011). Al-Mahrouq (2010) has identified five factors as determinants of SME success. These main factors include engineering and technology, business structure, financial structure, marketing and productivity, and human resources. Technology has been identified as a major determinant of SME success, for example Lin (1998) and Al-Mahrouq (2010), Indarti and Langenberg (2004). According to a study by Swierczyk and Hao (2003), obsolete technologies are a serious obstacle to business development, Ratnaningsih et al. (2010) classifies technology, research and development, and security management as a factor in business success.

According to Weckert (1992), a company may see its success in surviving in the market. This means that the greater the ability of a company to survive and remain in the market, the greater its success is. Mahanti (2018) notes that to achieve success, it is important for a company to ensure leadership and responsibility for management, change management, training and education, involvement and support from stakeholders, functioning data management, ongoing measuring of the monitored state, or expert knowledge and reliability of responsible persons. Data management is also related to the digital information model of a company, which indicates sources of a company's success. Success depends

primarily on the standardization of the platform and processes for integration and communication of individual departments, growth cost management, education and expertise, product standardization, and finally on defining and, most importantly, understanding the requirements of individual groups of information users, as noted by Amuda-Yusuf (2018). Tichá and Hron (2016) state that there are four important sources of key success factors, namely industry characteristics, competitive position, global environment, and organizational development. According to Weckert (1992), it is possible to identify factors that can have a significant impact on the success of a company by analysing the company's internal activities. The company can then take specific measures to develop its strengths and reduce weaknesses so that it succeeds in the market competition.

Thus, there are many approaches in the literature to define the success of a company, as well as many ways to determine the key determinants of business success. Some studies focus specifically on SMEs (e.g. Horne et al. 1992; Yusof and Aspinwall 1999; Masuo et al. 2001; Man/Lau/Chan 2002; Kislingerová and Nový 2005; Fairlie and Robb 2009 or Al-Mahrouq 2010), some studies aimed directly at the engineering sector (e.g. Ambler 2002; Halachmi 2005; Fortune and White 2006; Keller and Richey 2006; Weinzimmer and Manmadhan 2009; Philip 2010; Jasra et al. 2011; Chittithaworn et al. 2011; Chowdhury, Alam and Arif, 2013; Milichovsky, 2017; Fibitz and Ulrich, 2018 and more). From these studies it is clear that there are specifics of both the size of the enterprise and the specifics of a particular sector that determine the success of enterprises.

Ambler (2002) and Halachmi (2005) suggest that the potential of an engineering firm's success lies in the continuous globalization, internationalization and technological advancement of the fourth industrial revolution, Industry 4.0. It is also necessary to interconnect the engineering industry and other industries, internationally. Globalization is primarily related to the requirements for product quality, standardization, production and sales volumes and price. It is therefore necessary to deal primarily with marketing activities and components of its mix. It is primarily the elements of product, price and information about the market in which the company operates.

However, globalization brings with it increasing competition, in which the emphasis is on the considerable creativity of businesses. Here, innovation can be key to success, accompanied by management of skills and knowledge, the need for capital and resources, flexibility in organizational structure, or risk perception. (Fibitz and Ulrich 2018)

Appropriate modelling of individual elements of the marketing mix is also considered important for future success in the engineering industry by Milichovský (2017), who in his research found that considering the size of the company it is important to deal with the choice of price, communication channels and product policy. According to Keller and Richey (2006), the company's perception, repu-

tation and image can also be considered important factors for engineering companies. Of course, there is also branding, features and brand value. According to research by Jasra et al. (2011) financial or resource frameworks, marketing strategy, technology resources, government support, information access, business plan and entrepreneurial skills can be considered framework components of engineering business success. According to a study by these authors, financial resources, technology resources, government support, marketing strategies and entrepreneurial skills have a significant impact on business success. The most important factor, however, the authors consider the financial resources on which the whole enterprise depends. Philip (2010) defined ten basic areas of success factors: entrepreneurial personality and characteristics, business characteristics, management and know-how, product and services, customers and markets, business and business activities, resources and finance, strategy, external environment and internet. He identified the products and services, the external environment, and management and know-how as the key and most important factors affecting business success.

The above results are confirmed by another study by Chittithaworn et al. (2011), based on which the following were identified as the most important key factors influencing the company's success: the characteristics of the business, the customer and the market in which the business operates, the way of doing business and mutual cooperation in the business, financial resources and the external environment. Indarti and Langenberg (2004) take the view that business success is achieved by combining two key factors, education and resources, with resources representing access to capital, sufficient information from marketing activities and technology. Wijewarden and De Zoys (2005) also consider capital approach and marketing activities to be a key to success. In their marketing activities, they consider customer orientation and high product quality to be important. These authors also include management efficiency and support environment as key success factors.

Chowdhury, Alam and Arif (2013) identified marketing, technology, capital, infrastructure, government, policy and information as key success factors. From the social point of view, the authors also include the age, education and experience of employees. According to Chong (2012), success in engineering business is mainly influenced by management skills, state support, business experience, customer service, product and pricing policy, access to business capital and marketing. The results of their study show that the most important of these factors are customer service, managerial skills and product, including pricing policy.

The study by Al-Mahrouq (2010) points to the facts that key processes include the importance of technical processes and technologies, business structure, financial structure, marketing and human resources. We can also include strong leadership and management, motivation, management experience, personnel

qualifications, funds and resources, social capital and the regulatory environment (Wronka 2013).

The engineering company's success is also determined by its financial and economic situation. According to Masu (2001), the economic and financial measures examined include return on assets, sales, profits, sales growth, employee turnover and productivity, organizational structure or survival rate of the company on the market; Cowling (2007) share this view. Pticar (2016) also considers financial stability, sufficient funds and capital to successfully ensure the functioning of all key areas. In this area, the financial structure, size and structure of assets, as well as equity and debt, must be optimized. According to the studies of Fortune and White, (2006) and Weinzimmer and Manmadhan (2009), the success of the engineering business can also be found in the return on investment, increasing market share, business survival and achieving the desired results, which are at least comparable to the competition. The success of an engineering company is also defined by the correct specification of strategies and objectives. This is related not only to the appropriate organizational structure and management of business processes, but also to the business plan, which determines where the business should go. Before creating a business plan, according to Abrams (2014), it is important to state the factors that influence the success of the plan. According to the study, these include business concept, understanding the market, understanding trends in industry and its health, business focus, clear strategic position, motivation and retention of employees, or the ability to anticipate and adapt to change. Mapping the key factors is needed to support strategies for successful business operations. It means procedures and strategies in which the company must be better than the competition (Johanson & Scholes 2000).

The success of an engineering company is undoubtedly also influenced by the motivation of employees to engage in the processes that take place in the company. It is essential that employees not only work, but that their work is valuable. Positive development is achieved through the use of professional skills and knowledge of employees, set team culture, mutual social dependence and team work (Tarricone & Luca 2002). According to research by Nieuwenhuizen and Kroon (2003), the key success factors include human resources, namely their knowledge, skills and experience and the use of staff expertise. Business management, market orientation, customer service and understanding of financial markets and financial management are also essential for the success of engineering companies. According to these authors, innovations are also important in the field of production. Rose, Kumar and Yen (2006) agree with the option that the human resources are key success determinants. However, they do not consider employees, but primarily the entrepreneur and his personal initiative to be the key factors. Entrepreneurs continue to improve their management, improve entrepreneurial skills and have a positive attitude to learning and further develop-

ment. This helps to support the business and its products or services, to understand the market needs and feedback from its customers. Mahanti (2018) states that the success factors of an engineering company are greatly influenced by the management system. Within the management system, it is important to focus on responsibility for management, change management, training and education, stakeholder involvement and support, and the knowledge and skills of those responsible. We can say that success is conditioned by mutual business communication, management of development costs, education and product standardization. Perhaps the most important area is, according to Amuda-Yusuf (2018), an understanding of the requirements of individual groups of users of this information. Furthermore, many researches and studies (e.g. Chue et al. 1999; Fortune and White 2006; Zarina et al. 2014) agree that key success determinants are management support, qualified project, design and development managers, project team motivation, communication channels, effective control, planning and feedback, and the necessary financial budget. Fortune and White (2006) add that top management support, a set of goals and a detailed business plan are also needed. This is also supported by a study by Arcić (2018) whose results indicate that success is also determined by a well-designed functioning management model, properly defined support processes based on customer requirements. Clarke (1999) and Radujković and Sjekavica (2017) also find the potential of success in mutual communication in the cross-section of the whole company. In their studies, the key success factors include the clarity of objectives and their scope or the division of tasks into areas. The manager's competence, his / her emotional intelligence, team relations, the application of manager's knowledge and skills, organizational structure and culture, or adherence to standards also have a significant impact.

This confirms the view that the search for key factors is not easy and their determination is very subjective. The opinions, findings and results of individual authors can be intertwined, but also completely different. For this reason, in-depth interviews were conducted in 16 Czech engineering companies in order to find out what are the key success factors of engineering companies in the Czech Republic.

Methodology

In order to achieve the goal we set, it was necessary to use qualitative methods, mainly because our goal emphasizes the subjective perception of the researched issue by Czech engineering companies. The collection of primary data through an in-depth qualitative survey in the form of semi-structured interviews took place in the first half of 2019. The paper presented processed data from a total of 16 successful engineering companies in the Czech Republic. Respondents included companies of all sizes (micro, small, medium, and large companies) op-

erating mostly in the engineering industry. The addressed persons included owners, authorized agents, chief executive officers, or top managers with long-term experience in the field – on average around 19 years. Detailed identification of the respondents is given in Table 1.

The interviews were rewritten and subsequently analysed using the qualitative software MAXQDA, designed to process qualitative research data, allowing easy sorting, structuring and analysis of large amounts of text using segment code. The data were analysed by region and sub-region based on what the respondents mentioned in the qualitative interviews. Based on the link between the area and the sub-area, the strength of the connection between them is illustrated using mental maps. The results of the in-depth interviews were processed by the MAXQDA 2018 program into mental maps.

Table 1: Identification of respondents

Number	Position	Experience	Number of employees	Field of business	Region
1.	Authorized agent	10 years	3	Engineering, automation	Zlín Region
2.	Sales manager	20 years	1 500	Engineering	Olomouc Region
3.	CEO	25 years	585	Electro-engineering	South Moravian Region
4.	Director	27 years	13	Engineering, automation	South Moravian Region
5.	Manager	11 years	513	Engineering	South Moravian Region
6.	Authorized agent	40 years	120	Engineering	South Bohemian Region
7.	Director	25 years	48	Engineering	South Moravian Region
8.	Managing Director	20 years	12	Engineering	South Moravian Region
9.	Director	8 years	27	Engineering, industrial components	South Moravian Region
10.	Statutory director	16 years	300	Engineering, repairs of railway	Ústí Region
11.	Director	18 years	2 200	Engineering, metallurgy	Olomouc Region
12.	Project Manager	12 years	10	Engineering, machining, CNC, calibration	South Moravian Region

Number	Position	Experience	Number of employees	Field of business	Region
13.	Authorized agent	12 years	6	Engineering, machining, consultancy	South Moravian Region
14.	Authorized agent	25 years	25	Engineering, construction	Moravian-Silesian Region
15.	Authorized agent	10 years	5	Engineering	Hradec Králové Region
16.	Chief Sales Officer	20 years	180	Engineering	South Moravian Region

The results of the qualitative data collection could be divided into four areas. The first area deals with what motivates the respondents most in business and what their goals are, including the characteristics of business success. The second part focuses on successful and key areas and processes in the engineering industry and specific companies, including critical areas that require improvement. The third area deals with Industry 4.0, the degree of readiness of the addressed engineering companies for Industry 4.0, and the importance of keeping up-to-date with industry trends. The fourth area includes know-how, advice, and tips from the real business world on how to achieve success.

Based on these results, it was possible to define key success factors as they are subjectively perceived and applied by the interviewed experts in the engineering industry and it was possible to determine the success of an engineering company.

Findings

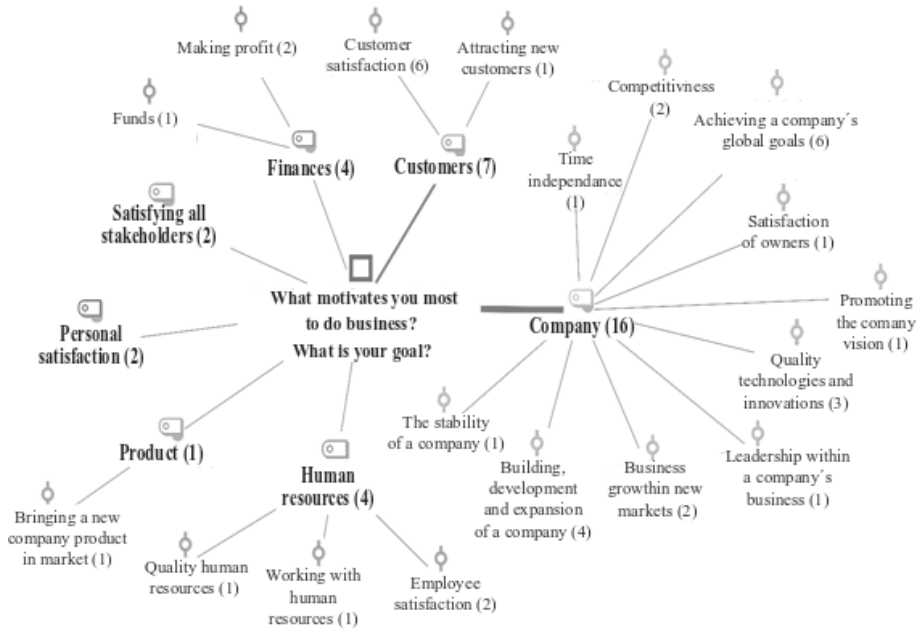
In order to determine whether a business is successful, it is necessary to know its motivation and goals. Therefore, in the presented results, business goals of examined companies are defined first. Furthermore, it is investigated how enterprises perceive success subjectively, what are the perceived determinants of success. Attention is also paid to what areas or processes of the company are subjectively considered by companies to be the most critical areas with regard to success. All this is necessary to put the subjectively defined success factors of Czech engineering companies in the context.

Kislingerová and Nový (2005), Veber (2005) or Abrams (2014) argue that the success of a company depends both on the goals set by that company as well as on individual interest groups' goals. The first area that was examined in the in-depth qualitative investigation therefore focuses on the most significant motivating factors in business and the main objectives of engineering companies. The results of the qualitative data analysis are shown in the mental MAXmap below, see Figure 1. Motivating factors and goals are related primarily to the engineer-

ing company itself and doing business – companies focus mainly on building their capacity, development, and expansion, which is closely associated with the growth of a company in new markets with new customers and products. This development must be healthy, given the state and condition of a company. Other motivating factors for success include high-quality technologies, available solutions for innovative production leading to customer satisfaction and functional machinery and equipment. Customer satisfaction results in competitiveness in the industry, which is also a frequent and important goal for engineering companies. The data shows that another goal is to achieve stability in a company, which helps to achieve time independence. Within multinational corporations, it is also vital that a company's individual goals are in line with its global goals. Other motivating factors include success and the effort to promote new visions, achieving leadership in the engineering industry, and thus satisfying the demands and needs of the owners.

The results suggest that customers, their satisfaction and acquisition, are among the goals leading to success in business as customer satisfaction creates a competitive advantage and makes a company competitive. Innovation and functional technologies also contribute to customer satisfaction. Finding and attracting new customers who demand existing or new products and services in existing or new markets can also be considered an essential goal. Among the main motivating factors for doing business are also funds, finances, and above all, making a profit for further development. This means that besides personal satisfaction, financial success is also a significant factor. It is not only the owners whose satisfaction matters but also the stakeholders whose expectations are to be met. In this context, it should be noted that employee satisfaction is an equally important goal and motivating factor, together with the quality of employees, their qualifications, and effective work with human capital. Management of human resources and their cooperation is crucial for achieving the requirements and objectives mentioned above.

Fig. 1: MAXmap – company motivation and goals

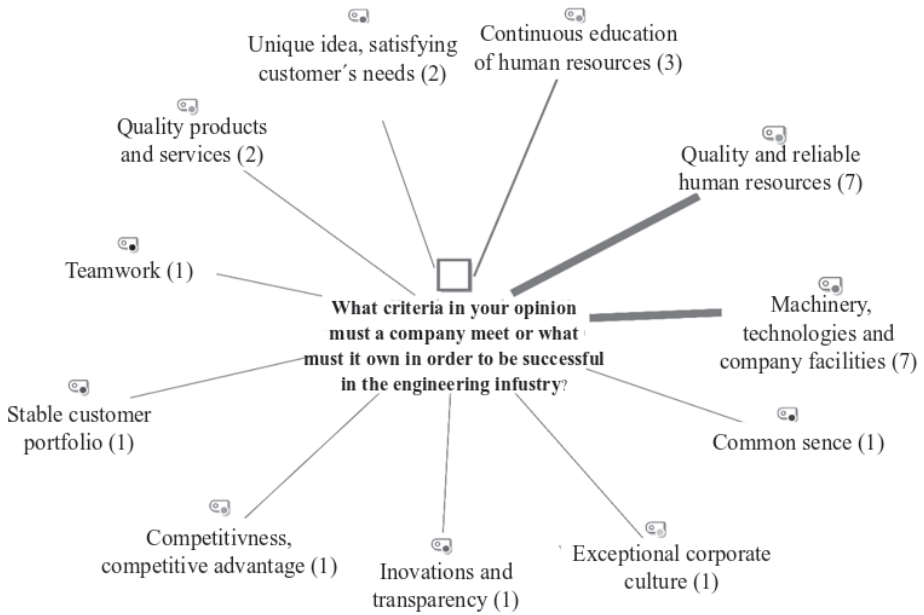


Source: Created by the authors

In connection with the motivation of a company and its goals, the authors also examined how experts from the interviewed engineering companies perceive success. Many authors, including, for example, (Fortune and White 2006; Weinzimmer and Manmadhan 2009), point out that the success of companies may take many forms, the fulfilment and significance of which varies for different stakeholders and interest groups. Based on the analysis of the data obtained from the interviews, it was possible to define 6 areas, which the respondents stated as their subjective perception of "the success of a company": satisfaction and stability of external and internal interest groups, healthy business development of a company and its prosperity, sufficient profitability, saleable products, company's technological growth, and long-term sustainability. The interviews showed that the vast majority of the interviewed companies perceive success primarily as the satisfaction and stability of both external and internal interest groups. Success is when all important stakeholders are equally satisfied. Success can also be characterized as meeting the goals of the healthy business development of a company and its prosperity. Long-term sustainability also counts as success in the engineering industry as the data suggests. Sufficient profitability and the presence of resources that contribute to a company's further technological growth and development are also decisive for a successful company.

Regarding the subjective perception of "the success of a company". the authors also investigated what the interviewed experts consider to be the main prerequisites for success for an engineering company. Based on a qualitative analysis of this data, it is possible to say that the most important prerequisites for success, as seen by the interviewed companies, are high-quality human resources and cutting-edge technologies, see Fig. 2. The strength of the links between the codes also suggests the importance of the education of human resources, as this will ensure that employees are able to operate high-quality, high-precision, cutting-edge technologies and technical equipment.

Fig. 2: MAXmap – prerequisites for success

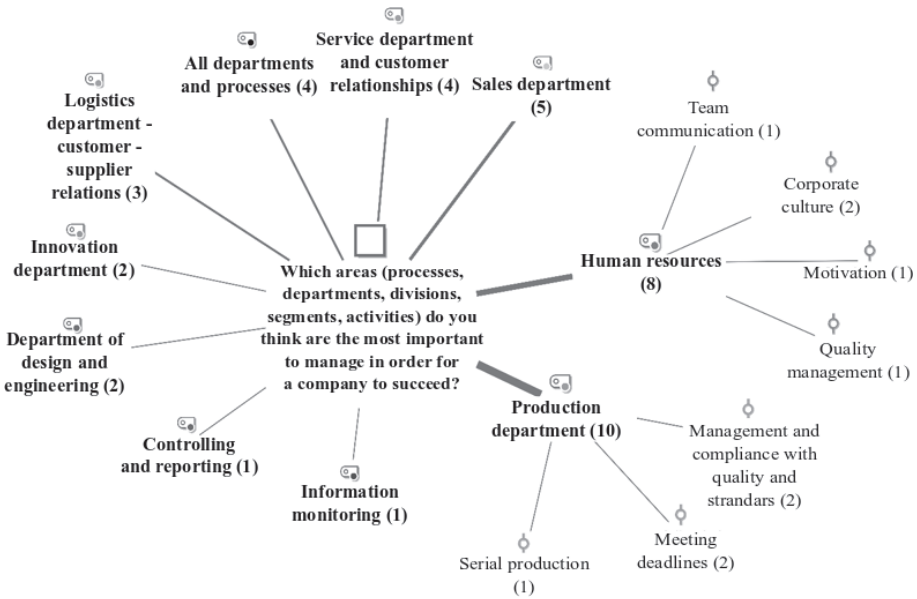


Source: Created by the authors

In order to make a complex assessment of the subjective perception of the success of an engineering company, the authors defined areas that contribute to the success of the interviewed engineering companies. Figure 3 shows that the areas that contribute most to the success of the interviewed companies in the respondents' opinion are human resources, production, development, technologies and technology, business or customers. The addressed experts emphasize human resources as the main determinants of success. However, it should be noted that the in-depth interviews have shown that the most pressing current problem in engineering is the critical situation in the labour market in the Czech Republic, where companies are feeling an acute shortage of human resources (especially

workers and mechanical workers), which affects their capacity to fulfil customers' orders. It is not only the number of potential employees that is critical, but also their quality and qualifications and the associated extreme pressure on labour costs. Another critical area is investments in production, i.e., the renewal of machinery and technological equipment, automation, robotic manufacturing, modernization, and so-called "lean" processes.

Fig. 3: MAXmap – areas determining a company's success

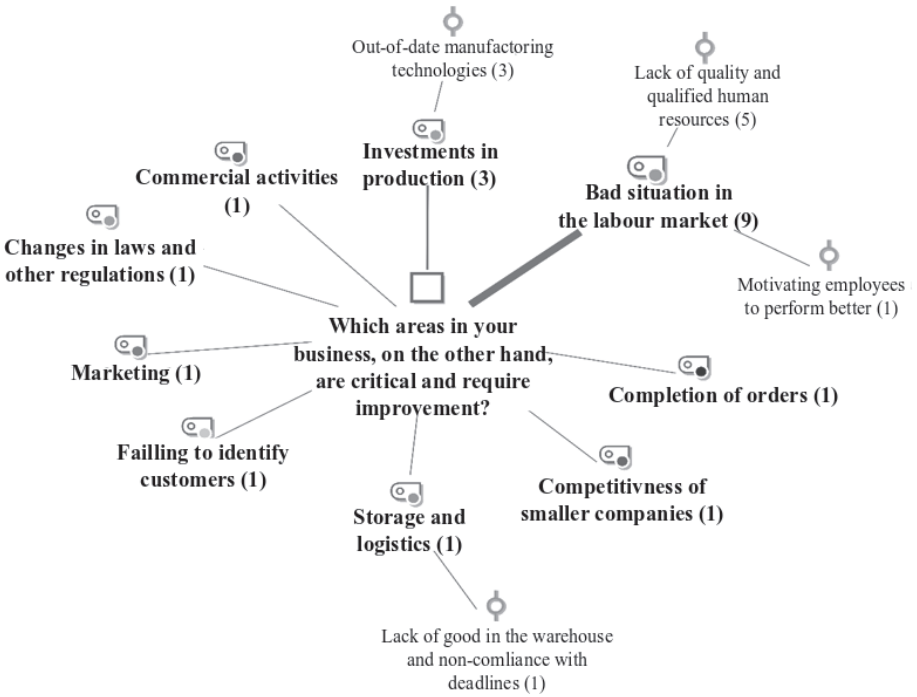


Source: Created by the authors

Many engineering companies have out-of-date manufacturing technologies that prevent introducing lean manufacturing and increasing productivity. The interviewed companies included commercial activities, marketing, failing to identify customers who merely look for product information without being genuinely interested in a product, as well as the lack of the competitive power of small businesses compared with big companies, as shown in Fig. 4. Logistics and warehousing were also included in problem areas experienced by engineering companies, because, given the significant growth of exports the availability of goods in stock has declined.

In line with our objective to conduct a qualitative survey, we asked the respondents what factors are, in their opinion, crucial for the success of an engineering company. The most frequently mentioned success factors are: the product, a stable company, human resources, customer-supplier relationships, and development and innovations.

Fig. 4: MAXmap – critical areas



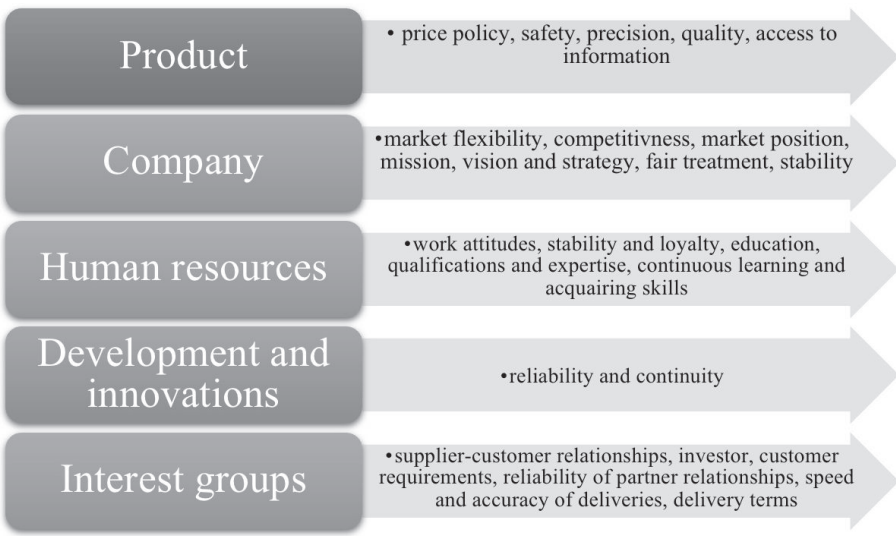
Source: Created by the authors

Regarding products, the respondents emphasize chiefly product quality and precision manufacturing. Product management also includes the issues of price policy of individual products and customer safety. The interview results suggest that company stability is another key success factor with emphasis on the fair treatment of all interest groups, clearly defined mission, vision, and company strategy, the reflection of its market position and its retention, and moreover, the ability to improve, flexibility in responding to market changes and the ability to adapt to fluctuations and company competitiveness. Human resources were identified as another key factor with emphasis placed not only on their education, qualifications, and expertise but also on their loyalty, stability, and dedication to work. Employees' work attitudes and clearly defined visions and strategies help to create a corporate culture and cooperation. Customer-supplier relationships were identified as another key factor. The respondents stressed the importance of speed and (above all) accuracy of deliveries, reliable partnerships including mutually beneficial delivery terms. Other key success factors mentioned by the surveyed engineering companies include the continuous process of education, learning, and gathering experience, meeting customers' quality requirements or having an investor with a clear idea of how the system works and suffi-

cient funds. Manufacturing processes require constant development and innovation, which is another key success factor. Investments in development should result in reliability and continuous development. Innovations are important for transforming existing products and their upgrade.

Based on the analysis of the obtained data, the subjectively perceived key success factors of the Czech engineering company can be summarized as follows, see Fig. 5.

Fig. 5: Key success factors – analysis of primary data



Source: Created by the authors

Discussion and conclusions

Based on the collection and analysis of primary data, it is possible to define the success of an engineering company as a state when a company achieves the satisfaction and stability of external and internal interest groups (especially employees), which contributes to its healthy development, technological expansion, and long-term sustainability through saleable products or services and sufficient resources for financing this state. This definition is in line with the findings of studies around the world and scientific literature. These studies, e.g., (Fortune and White 2006; Zarina et al. 2014; Arcić 2018; Mahanti 2018 or Amuda-Yusuf 2018) indicate that key factors determining this success include above all the company itself, its marketing mix and activities, human resources, customers, financial situation, management and the organization of processes, and the development and innovation of machinery and technologies. The external environ-

ment also has a considerable effect on a company's success. The collection and analysis of primary data obtained from expert in-depth interviews with successful engineering companies showed that these key success factors do not have much variety within the Czech engineering environment and include the company itself and its product, human resources, continuous development and innovation, and relations with interest groups. Long-term relevant experience of experts and successful engineering companies provide a solid ground for defining success in the engineering industry as a state when a company achieves the satisfaction and stability of external and internal interest groups (especially employees), which leads to its healthy business development, technological expansion, and long-term sustainability through its products or services capable of meeting customers' needs and sufficient resources to finance this success.

Table 2: Differences between the perception of key company success factors – Czech companies versus scientific literature

Defined key success factor	International environment – scientific literature	Domestic engineering – qualitative survey
Product	✗	✓
Marketing	✓	✗
Human resources	✓	✓
Customers/Purchasers	✓	✗
Company	✓	✓
Finances	✓	✗
Management	✓	✗
Development and innovations	✗	✓
Organization and processes	✓	✗
Machinery and technologies	✓	✗
Outer environment	✓	✗
Interest groups	✗	✓
Production	✗	✗

Source: Created by the authors

When we compare the key success factors presented in scientific literature and the data obtained from our qualitative survey in Czech engineering companies, we can conclude that the observed factors differ slightly, see Tab. 2. Key company success factors within the global environment are defined based on the following studies: (Leidcker and Bruno 1984; Milosevic and Patanakul 2005; Fortune and White 2006; Weinzimmer and Manmadhan 2009; Jakubíková 2013; Zarina et al. 2014; Mahanti 2018; Amuda-Yusu 2018; Fibitz and Ulrich 2018 and Arcić 2018). The key success factors (Tab.2) that are the same in these studies were extended by factors that emerged from the survey among Czech engineering companies, for example the analysed companies listed "product" as an independent factor of success (in literature this factor is classified into marketing) or the factor "development and innovation", which was also categorized as a part of the marketing mix (as part of the product element) in the cited foreign studies.

In the Czech engineering industry, the product can be considered a key factor. Chowdhury, Alam and Arif (2013) emphasize the product as a key success factor in the literature. While other authors, such as Ambler (2002) or Halachmi (2005) highlight marketing (neglected by Czech companies) as a priority – they claim that it is necessary to focus primarily on marketing activities and components of the marketing mix, but also emphasize the elements of the product and prices. It must be noted that the product itself has not been identified as a key success factor within the general global environment, but it is reflected in the marketing context. When speaking about a product, the pricing policy is essential for Czech engineering companies as it has a significant impact on their competitiveness, safety, product portability and quality. Other factors include sufficient knowledge of the economics of orders and the volume of orders. The breadth and depth of offered products and their high quality also play a significant role.

Marketing is recognized by scientific literature (e.g. Ambler 2002; Indarti and Langenberg 2004; Halachmi 2005; Wijewarden and De Zoysa 2005; Keller and Richey 2006; Milichovsky 2007; Jasr et al. 2011; Chowdhury, Alam and Arif 2013) as a key factor determining success. It is vital to pay attention to the complex marketing mix and its activities. The quality and price of a product and services play a significant role. Branding, i.e., defining a brand's features and values can also affect success, and so can the brand of a company itself. It is also necessary to gather information about the market, have a good understanding of it, and recognize the trends in individual business sectors. However, the interviewed Czech engineering companies have not identified marketing as a key factor, which may be rather alarming since collecting and analysing marketing information and following market trends are crucial factors for running a successful business; these success factors are accentuated e.g. by (Ambler 2002; Halachmi 2005; Kubíčková and Marková 2011 or Jasra et al. 2011). It is inter-

esting that marketing as such is not considered by Czech engineering companies as a key success factor, although Milichovský (2017) states that it is very important for future success to model the individual elements of the marketing mix in the Czech engineering industry. The explanation is that engineering companies accentuate only some elements of the marketing mix, such as a product, and then neglect marketing as a business function. The fact that Czech engineering companies do not regard marketing as an important success factor is that they also do not consider purchasing and customers as an important factor. It is necessary to pay attention to marketing because the analysed companies have included marketing and poor customer recognition among the critical areas (areas that negatively affect their success). Marketing in engineering is often considered unnecessary, arguments such as that "engineering and manufacturing do not need any marketing because they create special products that are unique with clear added value for users", or there are arguments that businesses "know their customers and don't want to bother them with marketing".

Human resources have been identified as a key factor both in foreign scientific literature (e.g. Nieuwenhuizen and Kroon 2003; Indarti and Langenberg 2004, who accentuates human resource education; Rose, Kumar and Yen 2006; Al-Mahrouq 2010; Wronka 2013 or Chowdhury, Alam and Arif 2013) and by Czech companies. In this area, it is important according to Czech companies, to focus on the qualifications, education, and experience of employees, the structure of human resources, their productivity and employee turnover, teamwork or communication and relationships. Employee stability and loyalty and a positive attitude to work are regarded as significant by Czech companies and so are continuous learning and gaining experience. Czech engineering companies do not put the customer above other key factors; instead, they focus on all interest groups. In this area, it is vital to forge reliable partnerships, manage customer-supplier relationships, and find a suitable investor. Managing customer-supplier relationships requires speedy and accurate deliveries in compliance with delivery terms.

The second key factor identified by the interviewed companies and emphasized in foreign scientific literature (e.g. Keller and Richey 2006; Philip 2010; Al-Mahrouq 2010; Chittithaworn et al. 2011; Wronka 2013) is the company and its capabilities and characteristics, with particular emphasis on its market share and competitiveness, good bargaining power, long-term practice, certain competitive advantage, know-how, stability, business experience, or the entrepreneur himself.

Surprisingly, the interviewed Czech engineering companies did not include the factors of finances, management, and organization among the key determinants of success, although they state among other things the necessity of "suitably defined goals as well as roles of individual corporate departments which must op-

erate in cooperation and interdependence," and the need for a "well-organized system of work and environmental policy". In this area, the interviewed companies place more importance on the management of duties and responsibilities, the quality management system, and controlling. On the other hand, Czech engineering companies view "research, development, and innovation" as a key success factor. The prevailing view is that innovation and product development must be reliable and continuous and that most investments should go into new technologies. This is in line with the finding that machinery and technologies play a critical role according to scientific studies (e.g. Pticar 2016), which point out that in addition to innovation, research and development, it is the technological resources and processes, infrastructure, access to information and digitization of the information model that are important. The argument that research, development, and innovation in technologies and IT are crucial for the success of not only engineering companies (Mahanti 2018), is evidenced by the fact that we are in the midst of the fourth industrial revolution, the so-called Industry 4.0. From this perspective, it is somewhat alarming that the interviews have revealed mostly an average level of readiness and implementation of the elements of Industry 4.0 in Czech engineering companies with small and medium-sized companies being significantly less prepared than big companies.

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