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Choosing an Employer

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Abstract

The purpose of this thesis is to understand the organisational and job factors besides financial remuneration inducing an engineer to prefer a start-up over a corporation as an employer. In doing so, the focus is on the influence that *Employer Branding* has on the decision-making of engineers living and working in Austria or Germany when applied in job advertisements. The innovative products and services developed by start-ups are essential to the health and growth of an economy. However, to promote innovation, start-ups are in need for engineering talent which is under high demand on the labour market. In this *War for Talent*, particularly start-ups and corporations are competing for talent. Nevertheless, start-ups have limited resources compared to established organisations. Therefore, to be able to compete with large organisations, it is essential for start-ups to identify the organisational and job characteristics that are important to engineering talent and to communicate them with potential employees. For that reason, this thesis studies whether the stating of four organisational and job factors in job advertisements of start-ups together with a higher personal risk tolerance of engineers are increasing the organisational attractiveness of start-ups over corporations. In this pursuit the concepts *Employer Branding* and *P-O Fit* are building the theoretical framework. Moreover, a thorough literature review on STEM recruitment is conducted.

The dataset of 131 valid cases was created by sending out an online questionnaire including a vignette study. Further, it was analysed carrying out a multiple regression analysis. The main results yield that only the factor *Personal Development in a Challenging Work Setting* has a statistically significant effect on the attractiveness of a start-up over a corporation. Moreover, the findings point out that the *Clarity of the Offered Career Advancement Opportunities* increase the attractiveness of start-ups. The findings are expected to support further research in the fields of STEM recruitment and *Employer Branding*. Moreover, they should guide start-ups in their aim to build an attractive *Employer Brand* attracting engineering talent.

Abstract

Das Ziel dieser Arbeit ist zu verstehen, welche organisatorischen und beruflichen Faktoren neben der finanziellen Entlohnung einen Ingenieur dazu bewegen, ein Start-up einem Konzern als Arbeitgeber vorzuziehen. Der Fokus liegt dabei auf dem Einfluss von *Employer Branding* in Stellenanzeigen auf die Entscheidungsfindung von Ingenieuren, die in Österreich oder Deutschland leben und arbeiten. Die innovativen Produkte und Dienstleistungen entwickelt von Start-ups sind für die Gesundheit und das Wachstum einer Volkswirtschaft wesentlich. Um jedoch die Innovation zu fördern, benötigen Start-ups technische Talente, die auf dem Arbeitsmarkt sehr gefragt sind. In diesem *War for Talent* konkurrieren insbesondere junge Start-ups und etablierte Konzerne um Talente. Allerdings verfügen Start-ups im Vergleich zu etablierten Konzernen nur über begrenzte Ressourcen. Um mit großen Unternehmen konkurrieren zu können, ist es daher für Start-ups von entscheidender Bedeutung, die organisatorischen und beruflichen Merkmale zu ermitteln, die für Talente wichtig sind, und diese mit potenziellen Mitarbeitern zu kommunizieren. Aus diesem Grund wird in dieser Masterarbeit untersucht, ob die Nennung von vier Merkmalen in Stellenanzeigen von Start-ups sowie die persönliche Risikobereitschaft von Ingenieuren die Attraktivität von Start-ups gegenüber Konzernen erhöhen. Dabei bilden die Konzepte *Employer Branding* und *P-O-Fit* den theoretischen Rahmen. Darüber hinaus wird eine Literaturrecherche zur MINT-Rekrutierung durchgeführt.

Der Datensatz von 131 gültigen Fällen wurde durch die Versendung eines Online-Fragebogens einschließlich einer Vignettenstudie erstellt. Anschließend wurde er mit einer multiplen Regressionsanalyse ausgewertet. Die Ergebnisse zeigen, dass nur der Faktor *persönliche Entwicklung in einem herausfordernden Arbeitsumfeld* einen statistisch signifikanten Einfluss auf die Attraktivität eines Start-ups gegenüber einem Konzern hat. Darüber hinaus weisen die Ergebnisse darauf hin, dass die *Klarheit der angebotenen beruflichen Aufstiegsmöglichkeiten* die Attraktivität von Start-ups erhöht. Es wird erwartet, dass die Ergebnisse die weitere Forschung in den Bereichen MINT-Rekrutierung und *Employer Branding* unterstützen werden. Außerdem sollen sie Start-ups in ihrem Bestreben unterstützen, eine attraktive Arbeitgebermarke aufzubauen, um Talente aus dem Ingenieurwesen anzuziehen.

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1. Introduction and Research Background

“Scientists study the world as it is; engineers create the world that has never been.”

Theodore von Kármán,

Hungarian-American mathematician and mechanical engineer (NSF, no date)

Throughout history engineers are transforming our lives. May it be by the development of the lightbulb, bike, car, aeroplane, bridge, or the 3D printer – without a doubt, engineering inventions are influencing our societies. In the 21st century the Science, Technology, Engineering, Mathematics (STEM) disciplines are more than ever demanded (Ainslie and Huffman, 2019, p. 36; Waite and McDonald, 2019, p. 4). With increasing digitalisation and automation of economies and societies, the demand for qualified engineering professionals is increasing in many areas of an economy. Thus, it is not surprising that “in 2022, almost 76 million people in the EU aged from 15 to 74 were employed in science and technology” (Eurostat, 2023). Nevertheless, due to labour shortages in all kinds of STEM professions but especially in the engineering fields, the competition on the labour market is considered as tense (European Commission, 2015, p. 5). While small and large companies are competing for scarce talent, means for talent attraction are earning more importance. Especially the smaller players such as Small and Medium-sized Enterprises (SMEs) as well as innovative and fast-growing organisations, here referred to as start-ups, are finding themselves disadvantaged in talent attraction. This is due to less (financial) resources and lower reputation compared to established corporations (Bittner-Fessler and Nelke, 2021, pp. 138-142; Bormans et al, 2021, p. 28; Gherghina et al, 2020, p. 3; Haag, 2021, p. 313; Stotz and Wedel, 2009, p. 11).

Since small companies are forming the core of the European economy (Ferraz and Pereira, 2017, p. 86), their economic success is essential. Moreover, start-ups are the main drivers of innovation and thus, essential in the pursuit to answer current and future challenges and to promote economic growth. Especially for these innovative and fast-growing organisations, finding the best talent is crucial for the development and survival of their business (Bittner-Fessler and Nelke, 2021, pp. 138-39; Ferraz and Pereira, 2017, p. 104; Roach and Sauermann, 2023, pp. 1, 4).

In order to attract talent, Haag (2021, p. 424) points out that for small and young companies it is important to create a positive perception as an employer within their (young) target group. This positive employer image should be sustainable and for the long-term (Haag, 2021, p. 424). Consequently, a strong *Employer Brand* communicating the message of being an attractive employer by presenting the target group of STEM professionals with relevant organisational and job characteristics is central to start-ups. That is why this master thesis is aiming to shed more light on the effects that organisational and job characteristics have on engineers when communicated in job advertisements. In a pursuit of giving young and innovative companies the right tools to be more competitive on the labour market, the research aims to explore the underlying motives that make engineers choose a start-up over a corporation as an employer. Therefore, this thesis is guided by the following research question:

“Under which conditions would an engineer choose working for a start-up rather than for a corporation?”

To achieve this, the following five hypotheses will be tested with a multiple regression analysis:

H1: Stating the opportunity to work in an innovative environment with cutting-edge technology in job advertisements increases the attractiveness of a start-up as an employer.

H2: Stating the opportunity to advance and develop skills and competencies in a challenging work setting in job advertisements increases the attractiveness of a start-up as an employer.

H3: Stating a positive and collaborative team climate in job advertisements increases the attractiveness of a start-up as an employer.

H4: Stating the receiving of autonomy and responsibility in job advertisements increases the attractiveness of a start-up as an employer.

H5: The greater the tolerance of engineers to accept a higher level of risk in terms of job and income security in order to work on an innovative project, the more attractive start-ups are perceived to be.

Since this master thesis has been conducted at the University of Vienna, the author's research interest lies in Austria. Further, the neighbouring country Germany has been included in the research because its industrialised economy is particularly affected by the labour shortage in STEM professions. According to the European Commission (2015, p. 5), the skill shortages are not only more strongly represented in certain areas, namely, engineering and Information and

Communication Technology (ICT) but also in certain regions. The European Parliament (2015, p. 16) states that the labour shortages in STEM professions are especially apparent in four of its member states, namely Germany, Austria, Belgium, and Poland. Moreover, Mrozek (2009, p. 20) also describes the shortage of skilled labour in Germany especially observable in the STEM fields and further, most visible for graduates in engineering and natural sciences. Therefore, this research is focused on the two German-speaking countries in the EU, namely, Austria and Germany. Furthermore, Germany shares the same language and a similar education system with Austria, which allows a relatively homogenic research setting. Due to its highly industrialised economy, it further offers a wide range of employment opportunities for engineers. Moreover, both countries are part of the single market of the European Union (EU) and hence, allow free movement of labour within the EU. Consequently, this master thesis will focus on engineers living and working in either Austria or Germany.

The quantitative data collection has been chosen as methodology in order to answer the research question. The data has been collected digitally via an online survey, which has been sent to engineers living in Austria or Germany via the professional networking site *LinkedIn*. In the next step, multiple regression was utilised to analyse the collected primary data of 131 respondents. The main finding of this study is that the stating of *Personal Development Possibilities in a Challenging Work Setting* in a job advertisement is increasing the attractiveness of a start-up. This implies that start-ups should focus on communicating their development opportunities in their *Employer Brand* in job advertisements as well as on other channels. With the findings, this master thesis aims at providing a basis for start-ups when setting up their communication goals and their *Employer Brand*.

Throughout the pursuit of answering the stated research question, the thesis is structured as follows. First, there will be an introduction to the nature of start-ups and their economic importance. Besides, a short definition of corporations which are their main competitors is given. Furthermore, light is shed on the challenges that start-ups are facing in general and more in detail in the Austrian and German economies. It follows a summary of the existing situation of labour shortages in the STEM and in the engineering field. The difficulties for start-ups to attract and retain STEM talent while competing with established corporations is pointed out in the literature review. In the next part, the overall strategy of *Employer Branding* in order to counteract the challenges is introduced. Moreover, the concept of *Employer Branding* is serving as the theoretical foundation of this study and is explained in detail following the literature review. More in detail, the concept of *Employer Branding* with a focus on the *Person-*

Organisation Fit (P-O Fit) are building the theoretical framework and guiding the construction of the hypotheses. This is complemented by a thorough literature review of current STEM recruiting literature. Closely linked to the theory and literature review, the five hypotheses from further above are established. Following the explanation of the theory and hypotheses, the methodological part is described. The data was collected via an online questionnaire which has been sent out to engineers on the professional networking site *LinkedIn* for six weeks. In order to test the hypotheses, the multiple regression analysis has been chosen. After the analysis of the data, the interpretation and discussion of it follows. Moreover, the discussion also includes the elucidating of the study's shortcomings and limitations. Finally, a conclusion of the study followed by an outlook is given.

2. The Economic Importance of Start-ups

The aim of this chapter is to describe the nature of start-ups as well as their economic importance. Nowadays, the term *start-up* is spoken around the world, however, there is not a clear definition of it (Szarek and Piecuch, 2018, p. 390). Rather, there exists a multitude of terminologies that can fall both under the concept of a start-up and a SME. Even though a start-up can be a SME at the same time, there are certain characteristics that highlight the distinct nature of it. The following two subchapters will elaborate the distinctive characteristics of start-ups as well as their innovativeness and thus, economic importance. Moreover, a short definition of corporations is given at the end of the next section.

2.1. The Characteristics of Start-ups

Instead of one general definition, several attributes that are universally agreed upon are describing the term start-up (Haag, 2021, pp. 2-9). Thereby, the characteristics can overlap with the characteristics of SMEs. Nevertheless, SMEs in comparison to start-ups are classified according to set threshold values of employees, annual turnover, or the total balance sheet (Haag, 2021, p. 9). In the definition of the European Union, SMEs have a maximum of 249 employees and €43 million in their balance sheet (IfM, no date; WKO, 2023). These thresholds can also be met by start-ups, nevertheless, when also reporting high levels of innovativeness and/or growth as well as being founded less than 10 years ago, then a business is typically referred to as a start-up (Haag, 2021, p. 9). It follows that a company can be a start-up at first and then develop to a SME, while these phases are likely to overlap or to happen at the same time (Haag, 2021, p. 9).

More specifically, the following points are summed up in the Austrian, German, and European start-up monitors as the main attributes that identify business ventures as start-ups:

- *The business is younger than ten years, and*
- *“[has an] intention to grow” (Bormans et al, 2021, p. 5) given by a planned employee/revenue growth, and/or*
- *is (highly) innovative in their products/services, business models and/or technologies (Bormans et al, 2021, p. 5; Kollmann et al, 2022, p. 6; Leitner et al, 2023, p. 6).*

In summary, there are three key properties of start-ups: *Age*, *innovation*, and *growth* (Haag, 2021, pp. 2-3). The last property, either concerning actual or planned revenue or employee growth or both, is considered as the most salient feature and aimed to be achieved through innovative products, services, or business models (Bittner-Fessler and Nelke, 2021, p. 138; Haag, 2021, p. 2). Whereas the first property is set as a fixed distinguishing figure with a frame of 10 years (Haag, 2021, p. 2; Kollmann et al, 2022, p. 6). It follows that the term start-up is only temporarily applicable to small and innovative companies (Szarek and Piecuch, 2018, p. 390). It is important to note that the term start-up does not simply refer to a newly founded company or a company less than 10 years old, but its innovativeness and/or strong growth are crucial for its classification as a start-up (Kollmann et al, 2022, p. 11).

The term start-up is functioning as an overall research unit for this thesis. That is because start-ups are characterised by strong innovation and growth. While the study refers to young and innovative companies as start-ups, also other terms may fall into this understanding. For example, Czarnitzki and Delanote write in their research on “Young, Innovative Companies (YICs)” (2013, p. 1316), and attribute them similar characteristics as has been done here to start-ups. Moreover, spin-offs are created by large corporations to generate innovation and fall into this categorisation (Adams, Alexander, and Öberg, 2014, pp. 1-2; Poehlmann et al, 2021, p. 1768). Spin-offs are newly formed businesses originating from an established organisation, which could be a university or a company (Adams, Alexander, and Öberg, 2014, p. 2). Although considered as “subsets of start-up firms” (Poehlmann et al, 2021, p. 1768), spin-offs are not in the focus of the study. This thesis is focussing on the specific nature of start-ups without a corporate or institutional background.

Finally, corporations will be defined for the purpose of this study. The term corporation typically refers to large and established companies which are owned by shareholders (Cambridge University Press, 2024; Investopedia, 2024). Due to their legal structure the raising of capital is facilitated (Corporate Finance Institute, 2024). Moreover, corporations have limited liability, and their business is commonly understood as less risky compared to start-ups (Czarnitzki and Delanote, 2013, pp. 1316, 1319). In the next section the innovativeness of start-ups is elaborated. The following chapter is then discussing the challenges start-up ventures are generally faced with.

2.2. Start-ups and Innovation

Start-ups may be young and small compared to large corporations, but they are essential for the economy. In Europe, SMEs are building the core of its economy and are therefore central to the creation of new jobs (Burkhardt, 2008, p. 4; Gherghina et al, 2020, pp. 1-2). Moreover, today's “economies become more innovation-driven” (Baggen et al, 2016, p. 193). Thus, one major mean of small companies to differentiate from large competitors is to develop highly innovative products and services (Gherghina et al, 2020, pp. 1-2). An innovation refers to both the profound enhancement of an existing product or the introduction of a new product or process (Gherghina et al, 2020, p. 4; Sehnem et al, 2022, p. 1293). Moreover, innovation is also the actual process of bringing forth a new product through research and development (Gherghina et al, 2020, p. 4).

Small companies can faster adapt to changes in the economic setting due to their size and underlying organisational structure (Gherghina et al, 2020, p. 1). According to Audretsch, Belitski and Caiazza (2021, p. 1996), innovative start-ups more efficiently adapt to external market needs and answer with new products and services. They make a more efficient use of knowledge spillovers from their environment and convert the information into innovative ideas (Audretsch, Belitski and Caiazza, 2021, pp. 1999, 2007, 2010). While large organisations are likely to report a high rigidity, small companies demonstrate a greater adaptation to technological changes, a greater emphasis on income distribution, as well as they respond more flexibly to market fluctuations and novel customer demands (Gherghina et al, 2020, p. 1). Furthermore, it is the technologies and innovations developed and implemented by start-ups that are key drivers for many areas of the German and Austrian economies (Kollmann et al, 2022, p. 11; Leitner et al, 2023, p. 18). For example, the sustainable energy supply or efficiency improvement through digital processes are two major areas for innovation through start-ups (Kollmann et al, 2022, p. 11). Also, the sustainable use and reuse of natural resources is central to the business models of start-ups as Sehnem et al (2022, pp. 1296-98, 1302, 1304) have found in their study conducted in Brazil. Thus, it is not surprising that in Austria “[e]very second startup pursues overriding corporate goals in the areas of ecology and/or social issues” (Leitner et al, 2023, p. 12). Furthermore, following Kollmann et al (2022, p. 31), 46% of the surveyed start-ups categorise their products and services as part of the ‘Green Economy’ and around 42% see them in the area of ‘Social Entrepreneurship’. Besides, Blundel and Hampton assessed in their study the strong impact of new business ventures with a focus on environmental and societal innovation, which the authors refer to as “‘green’ (or sustainability) start-ups” (2021, p. 6). Hence, start-ups are a main component for the development of disruptive social and

environmental solutions in societies (Sehnem et al, 2022, p. 1293). And thus, the sustainable inventions of start-ups are further “supporting the achievement of the 12th SDG (i.e., Responsible Consumption and Production)” (Sehnem et al, 2022, p. 1293).¹

The ability of young and small companies to bring forward *radical innovation* and *disruptive technologies* has been proven (Czarnitzki and Delanote, 2013, pp. 1318-19). Which, in turn are assumed to be major determinants for industrial change and economic growth (Czarnitzki and Delanote, 2013, p. 1335). Furthermore, by introducing new products to the market also other companies can expand upon the innovations (Czarnitzki and Delanote, 2013, p. 1335). Following the findings of Audretsch, Belitski and Caiazza (2021, p. 2007), start-ups are more innovative compared to incumbent firms. Nevertheless, often the large-scale success of the innovative products developed by small companies is only feasible in cooperation with larger organisations (Blundel and Hampton, 2021, p. 9; Prado and Bauer, 2022, p. 4). While small companies are likely to be dependent on public and private funding, large corporations are in need for agile organisational structures. As a result, large technological companies acquire a multitude of young and innovative start-ups, which are in the initial phases of product development (Prado and Bauer, 2022, pp. 1, 4).

Moreover, the need of innovation is also visible in the creation of spin-offs as mentioned in the previous section. Their aim is to build on the existing knowledge existing in the established organisation and to bring forth more agile and innovative responses to emerging challenges (Adams, Alexander, and Öberg, 2014, p. 2). Spin-offs enable agile structures and at the same time are likely to access corporate knowledge, human capital and relations, financial and other resources (Poehlmann et al, 2021, pp. 1768, 1773, 1775). Therefore, spin-offs are similar to start-ups in their nature and their importance to promote innovation and technological advancement (Poehlmann et al, 2021, p. 1768). Their existence underlines therefore also the innovation capability of start-ups.

It can be concluded that start-ups provide new “innovative technologies to the society” (Szarek and Piecuch, 2018, p. 397) and thus, are highly beneficial for the European and national economies as well as for regional development. According to Ferraz and Pereira (2017, p. 104), small and innovative companies are central to the economic health, here measured by the Gross Domestic Product (GDP), of European countries. It is expected that start-ups are providing the institutional framework for knowledge to be shared and applied in order to find solutions for

¹ SDG is the acronym for Sustainable Development Goals, which are 17 worldwide agreed upon goals for socially, economically, and environmentally sustainable development (Vereinte Nationen, 2024).

existing and future challenges (Endreß and Matys, 2010, p. 106). Following Endreß and Matys (2010, p. 106), this is particularly assumed for technological innovations. Thus, in order to promote technological advancement, Germany and Austria are following the European strategy on fostering innovation and are considered as “the most entrepreneur friendly countries” (Szarek and Piecuch, 2018, p. 397) in Europe.

Start-ups are advantageous for the economy because of their strong development of new knowledge and their contribution to technology transfer which in return also creates more jobs (Fryges, Müller, and Niefert, 2014, p. 369; Kollmann et al, 2022, pp. 11, 18). Furthermore, Szarek and Piecuch (2018, p. 397) point out that start-ups are especially interesting for young talent that is interested in developing its skills within a highly innovative and creative environment. On the one hand, talent is the main resource of small and innovative companies. Following the literature review of Blundel and Hampton, the “development of specific technologies is [primarily] derived from engineering and other STEM disciplines” (2021, p. 7). On the other hand, start-ups foster innovation in economies and entrepreneurial learning of personnel (Baggen et al, 2016, pp. 193, 196). Especially for countries like Germany which have high labour costs and low natural resources, (tacit) knowledge brought into a company with its employees is a key competitive advantage in order to tackle economic, social, ecological, and technological challenges of today (Stotz and Wedel, 2009, p. 48). These dependencies underline again why the success of start-ups in attracting the right talent is essential to an economy.

The focus of this study lies on start-ups because they are key drivers of our economies. Predominantly “[t]echnology startups play a key role in innovation, economic development, and job creation” (Roach and Sauermann, 2023, p. 1). Following the definition and the outlining of the importance of start-ups, the challenges start-ups are facing will be described in the next section. Following the elaboration of challenges in the recruitment of talent for start-ups, the strategies to encounter them will be presented. In the chapter that follows, the strategy of *Employer Branding* is introduced and outlined in detail. *Employer Branding* serves further as the guiding theory of this thesis.

3. Challenges Faced by Start-ups

As elaborated in the previous chapter, start-ups embody organisations that are founded on an innovative concept for a product or service that does not exist yet on the market (Szarek and Piecuch, 2018, p. 390). Thus, they are “pioneer[ing] business ventures” (Szarek and Piecuch, 2018, p. 390) which create new offers. For the sake of innovation, start-ups are likely to accept a higher degree of risk than incumbent firms (Audretsch, Belitski and Caiazza, 2021, p. 1998; Czarnitzki and Delanote, 2013, pp. 1316, 1319; Roach and Sauermann, 2023, p. 4; Zhang, 2021, p. 1). Whereas start-ups are bringing forth innovative products and pioneering technologies that could possibly open entirely new market opportunities, incumbent firms tend to focus on gradual improvements (Czarnitzki and Delanote, 2013, p. 1316). These enhancements are rather aiming to safeguard the existing market positions and capabilities of the company rather than introducing radical innovations (Czarnitzki and Delanote, 2013, p. 1316). Consequently, while pursuing completely new ways, start-up operations also face a considerably higher risk (Roach and Sauermann, 2023, p. 4; Szarek and Piecuch, 2018, p. 390). Thus, it is not surprising that more than the half of the start-ups are not succeeding with their business idea in the first years (Eisenmann, 2021, p. 78; Fuertes-Callén, Cuellar-Fernández, and Serrano-Cinca, 2022, p. 1318). In total, around 90% of the founded start-ups are unable to foster a prosperous company (Startup Genome, 2019, p. 19).

Moreover, the developing of new products and services carries with them not only an increased risk but also more costs and uncertainty (Audretsch, Belitski and Caiazza, 2021, p. 2007). Start-ups tend to have lower financial resources and at the same time high needs for marketing and branding as well as for specific knowledge and skills (Haag, 2021, p. 313; Roach and Sauermann, 2023, pp. 2, 4). Young or small companies in general are faced with budgetary constraints compared to large corporations (Gherghina et al, 2020, p. 3). It is also referred to as the *liability of newness* that start-ups and other forms of young companies encounter (Adams, Alexander, and Öberg, 2014, p. 9; Poehlmann et al, 2021, p. 1773). The liability of newness “manifests itself in a number of dimensions including limited resources, market uncertainty, knowledge deficiencies and unproven legitimacy” (Adams, Alexander, and Öberg, 2014, p. 9). Therefore, to be successful it is essential for start-ups to employ their limited resources efficiently (Zhang, 2021, p. 1).

Furthermore, due to their high innovativeness, many start-ups are also likely to be dependent on large-scale funding in their first business years. Consequently, funding is a challenging task for most of the small businesses being established. While the entrepreneurs' capital and bank borrowing are important means of funding, also public funds by the national government or the EU play a major role (Gherghina et al, 2020, p. 3; Szarek and Piecuch, 2018, p. 390). Besides, private investors and other founders that often function as business angels are important for the financing of small and innovative companies (Szarek and Piecuch, 2018, p. 390).

Leitner et al (2023, p. 12) have found that raising capital has become a bigger challenge for start-ups due to recent economic developments in the first years of the 2020s. Nevertheless, around 360 start-ups are founded every year in Austria with many being located in the capital, Vienna, creating around 25,000 jobs (Leitner et al, 2023, p. 13). Since “[i]nnovation in start-ups requires skills and competencies which may not be available in-house, [...]” (Audretsch, Belitski and Caiazza, 2021, p. 2011) further expansion in personnel is planned by 84% of the Austrian start-ups for the upcoming years in order to enable development and growth (Leitner et al, 2023, p. 7). However, the situation on the job market is tight, also caused by a challenging economic environment in recent years, which makes it more difficult for companies to achieve their goals in staffing (Leitner et al, 2023, p. 7). As a result, nearly one third of the Austrian start-ups are stating that they have difficulties with recruiting the required talent, especially when searching for employees from within specialised fields (Leitner et al, 2023, p. 52). Further, the report explains that positions that require candidates with an academic background and/or relevant working experience of one and up to three years are especially difficult to find (Leitner et al, 2023, p. 53). Consequently, the recruitment of qualified employees is identified as a key driver and at the same time as a major challenge for Austrian start-ups (Leitner et al, 2023, p. 7). Moreover, also according to Kollmann et al (2022, pp. 7, 42), the shortage of skilled personnel continues to worsen for start-ups in Germany and thus, an increasing number of them identify personnel recruitment as a central challenge next to customer acquisition, product development, and capital procurement.

It is likely to be a major challenge for young companies to attract talent due to comparable low financial compensation and incentives (Bormans et al, 2021, p. 28; Haag, 2021, p. 313; Roach and Sauermann, 2023, p. 1; Tumasjan, Strobel, and Welpe, 2011, p. 111). Following the findings of the European start-up monitor, the innovative and young business ventures “are often unable to compete with wages offered by big companies even for entry level positions, which makes competition with these big players even harder” (Bormans et al, 2021, p. 28).

Moreover, wage-related costs in many European member states make it difficult for start-ups to hire qualified and “highly educated employees” (Bormans et al, 2021, p. 28). However, only with the right talent, businesses can stay competitive (Stotz and Wedel, 2009, p. 48).

3.1. Skilled-labour Shortage and Europe's Future STEM Supply

The shortage of skilled labour is a well-known phenomenon of our times (Mrozek, 2009, p. 1). Isbell et al state in their study: “The widening [workforce] gap between open positions and appropriately skilled, available candidates to fill them is a reality” (2008, p. 52). Consequently, according to the European Parliament (2015, p. 16), employers are increasingly concerned about the skill shortages existing today and may form in the future. Nevertheless, this scarcity is more prevalent for “technically skilled positions” (Isbell et al, 2008, p. 52). Also, the European Commission (2015, p. 3) is increasingly voicing its concerns about the shortage in STEM professions. The skills associated with these professions are in growing demand and expected to lead innovation and to address current challenges connected to the technological advancement as well as social, political, and economic developments of our times (Andrée and Hansson, 2015, p. 76; Lucas and Spina, 2022, p. 63; Roach and Sauermann, 2023, p. 1; Waite and McDonald, 2019, p. 4; Wall Bortz et al, 2020, pp. 928-29; Wang et al, 2024, p. 1). It follows that the skills of STEM professionals are deemed as essential for the level of innovation and economic growth (Waite and McDonald, 2019, p. 4). Therefore, especially “technology startups rely critically on talented scientists and engineers to commercialize new technologies” (Roach and Sauermann, 2023, p. 1). Without employing highly skilled engineers and scientist, start-ups are unlikely to succeed with the process of bringing a new technology or innovation to the market (Roach and Sauermann, 2023, p. 4). Accordingly, it is essential for (technology) start-ups to attract STEM talent.

This skilled labour shortage is due to several reasons but most importantly are to name the sociodemographic changes and the technological advancement which requires constantly altering skills of employees (Bittner-Fessler and Nelke, 2021, p. 137; Boswell et al, 2003, p. 23; Gurtner, Kels, and Scherrer, 2017, p. 174; Stotz and Wedel, 2009, p. 45). While the former is caused by an ageing population and decreasing birth rates, the latter is concerned with the availability of superior technical skills, which are viewed as strong catalysts of knowledge- and technology-induced growth and increases in productivity in high-tech industries (European Commission, 2015, p. 3; Mrozek, 2009, p. 12). Overall, a high percentage of the workforce is retiring in the upcoming years and not enough young workers are available on the labour market

to meet the identified need in businesses (DeFraine, Williams, and Ceci, 2014, p. 1; European Commission, 2015, p. 3). Furthermore, jobs are becoming increasingly knowledge-intensive rather than work-intensive (Stotz and Wedel, 2009, p. 45). The European Commission (2015, p. 3) is raising concerns over the changing demand for skills. Future technicians and engineers will need to learn to adapt and to acquire new skills because of “factors [such] as technology convergence, the Internet of Things, and pressures to exploit technologies in innovative ways to meet more diversified demands from global markets” (European Commission, 2015, p. 3). Consequently, the STEM professions are under high demand but do not offer enough young and skilled professionals in the future. Moreover, the comparably lower attractiveness of Europe compared to other countries, mainly the United States, as a desired place to work and/or to relocate for domestic talent and talent from abroad is another factor of this development (European Commission, 2015, p. 3; European Parliament, 2015, p. 16). Stotz and Wedel (2009, p. 46) state that especially countries such as Germany have difficulties in appearing as attractive to talent because of higher costs of living and a significant difference in the tax burden compared to other countries. Lastly, also due to the low number of female students in STEM programmes, but predominantly in engineering studies, the majority of the countries within the EU are faced with severe labour shortages (European Commission, 2015, p. 3).

In summary, there can be observed a growing labour shortage in the STEM professions caused by demographic changes but also by altering demands from the industries. Since engineers are found to be in particularly high demand (Gurtner, Kels, and Scherrer, 2017, p. 174; Mrozek, 2009, p. 20), this master thesis will focus on the profession of engineering. The following section is concerned with the strategies to encounter the *War for Talent*. Thereby, it is leading to the guiding theory of *Employer Branding*, which is discussed in the fourth chapter.

3.2. Strategies for Encountering the War for Talent

Stotz and Wedel (2009, p. 45) speak of a long-term shortage of skilled workers which results in a fierce competition for talent. This situation on the labour market is also referred to as the *War for Talent* (Ternès and Runge, 2016, p. 3). The companies are competing for talent and the potential employees have a wide range of employers to choose from (Stotz and Wedel, 2009, p. 47). Consequently, the conditions on the job market have changed and this change is expected to take place even stronger in the future (Stotz and Wedel, 2009, p. 47). Since the demand for skilled workers is on a peak and expected to further increase, there exists a global competition on STEM professionals between different employers and countries (Ainslie and Huffman,

2019, p. 36; Bittner-Fessler and Nelke, 2021, pp. 137-38; Zwetsloot, 2022, pp. 3-4). Besides large and established companies, especially the start-up scene is facing the challenge of skilled labour shortage in a growth-oriented business (Bittner-Fessler and Nelke, 2021, p. 138). Therefore, for young start-ups the main competitors in the *War for STEM Talent* are established and large companies (Bittner-Fessler and Nelke, 2021, p. 139; Muc and Schümchen, 2021, p. 93; Roach and Sauermann, 2023, p. 1).

The scarcity of skills is a well-known and persistent issue for science, business, and governments (European Parliament, 2015, pp. 12; 24-26). Moreover, there exists already an extensive body of literature on skill shortages in the STEM professions. Consequently, over the past two decades, various approaches have been adopted to address this ongoing challenge (European Parliament, 2015, pp. 12, 24-26). For the countries themselves a way to answer these shortcomings aims to adapt and improve existing STEM teaching structures (European Parliament, 2015, p. 16; Ferraz and Pereira, 2017, p. 104; Korte, Brunhaver, and Zehr, 2019, p. 93). Thereby, Germany, the Netherlands, and Norway put strong emphasis on the attraction of women to pursue a career in science, starting with the increase of the number of girls in scientific studies (European Parliament, 2015, p. 16). Besides, the improvement and introduction of social benefits for families is aiming to counteract the demographic changes, however, it will take time to see the effects of these policies on the labour markets (Mrozek, 2009, p. 17).

For organisations, one solution employed on the way of battling the *War for Talent* is the concept of *Employer Branding* (Martin, Gollan, and Grigg, 2011, p. 3619). For the development and success of a company, highly skilled employees from technological fields are key drivers (Bittner-Fessler and Nelke, 2021, p. 138; Mrozek, 2009, p. 1). In order to attract the highly sought-after skilled STEM talent, however, it requires companies to position themselves as an attractive employer (Mrozek, 2009, p. 1). Consequently, it is essential for start-ups to employ their resources efficiently and directed towards their target group. Thereby, employers must differentiate themselves from competitors in order to attract the desired talent (Mrozek, 2009, p. 22). In this pursuit, the concept of *Employer Branding* is receiving growing interest in the last years. In the following chapter, the theory of *Employer Branding* with a focus on the *P-O Fit* are explained in detail. It is further building the theoretical framework for this study.

4. The Concept of Employer Branding

In the pursuit to recruit and keep fitting and skilled employees, the Human Resources (HR) departments have gained attention (Tanwar and Kumar, 2019, p. 799). As explained above, the strategic approach to tackle the shortage of skilled labour is to build a strong *Employer Brand* (Martin, Gollan, and Grigg, 2011, p. 3619; Tanwar and Kumar, 2019, pp. 799 - 803). The development of a strong *Employer Brand* is an essential competitive advantage in today's tight labour markets for the attraction of qualified talent (Stotz and Wedel, 2009, p. 2). Understanding the factors that influence a potential candidate's decision to prefer a job offer or to choose an employer over another is thereby essential (Boswell et al, 2003, p. 23).

Starting in the 1970s the idea of *Employer Branding* found its beginnings in selling a job by instruments of personnel marketing (Stotz and Wedel, 2009, p. 12). However, only in times of low supply on the labour market, the concept of *Employer Branding* gained more attention (Stotz and Wedel, 2009, p. 19). Hence, capturing interest in the 1990s, *Employer Branding* describes the strategic aims of a company to present itself attractively not only to the customers willing to buy its products or services but also to those willing to work for the company (Ternès and Runge, 2016, p. 3). The concept of the *Employer Brand* was introduced by a British consultancy in order to increase the identification of employees with their employer and to gain a competitive advantage in the *War for Talent* (Stotz and Wedel, 2009, p. 12). Nevertheless, it took another few years until the concept was discussed further in the research of marketing and brands (Stotz and Wedel, 2009, p. 12). With the rising shortage of skilled labour and as a result, a strong competition on the labour market, the *Employer Branding* was finally gaining in popularity in both companies and research (Stotz and Wedel, 2009, p. 12). Thereby, the main focus of *Employer Branding* was on the effect of external marketing and communication such as in job advertisements, public relations, and events to facilitate the attraction of talent (Martin, Gollan, and Grigg, 2011, pp. 3619). However, it is important to note that the internal application of HR processes and products is needed for the success of an *Employer Brand*. The approval from inside the company, i.e. the actual employees, is essential for the credibility of a company on the labour market. The benefits of an *Employer Brand* can be communicated as great as possible, nevertheless, the actual approval of these benefits by a company's employees will signal the trustworthiness of the promises made.

Employer Branding is describing the philosophy of an organisation that is lived from the inside to the outside (Stotz and Wedel, 2009, p. 13). Moreover, Hoppe defines *Employer Branding* as the “communication about the uniqueness of an employer to external and internal stakeholders” (2018, p. 452). While *Employer Branding* cannot be reduced to several actions, it rather describes the overall efforts of a company to appear as an attractive employer (Elving et al, 2013, p. 357). According to Martin, Gollan, and Grigg (2011, pp. 3619), it is the combination of branding approaches along with marketing and communication concepts, and strategic methods of Human Resources. Thereby it involves actively communicating, both internally and externally, the unique and desirable organisational characteristics that distinguish it from other companies (Elving et al, 2013, p. 357; Hoppe, 2018, p. 453). Essentially a company needs to identify its very own Unique Selling Proposition (USP) as employer and communicate it to the target group (Stotz and Wedel, 2009, p. 10). In summary, *Employer Branding* is the part of strategic Human Resources Management (HRM) where the unique aspects of the company as an employer are developed, put into practice, and communicated both internally and externally (Stotz and Wedel, 2009, p. 10).

By applying strategic measures, a Human Resources department aims to gain a positive reputation with key stakeholders in- and outside of its organisation (Stotz and Wedel, 2009, p. 13). The strategic measures must be oriented towards the organisation’s current, former, and potential employees in order to appear as an attractive employer and to develop a manifested *Employer Brand* on the labour market (Stotz and Wedel, 2009, p. 14; p. 19). Similar to the concept of a brand, the aim of *Employer Branding* is to be the preferred employer for the target group (Stotz and Wedel, 2009, p. 30). The talent engagement and retention are increased as well as the talent attraction is facilitated by differentiation of other employers on the labour market and by being recommended as an employer by existing and potential employees (Tanwar and Kumar, 2019, p. 800).

Consequently, *Employer Branding* is not merely a collection of deliberate actions but instead, it primarily embodies the philosophy and values that define a company (Martin, Gollan, and Grigg, 2011, pp. 3630; Stotz and Wedel, 2009, p. 13). According to Martin, Gollan, and Grigg (2011, p. 3630), with the help of *Employer Branding*, the organisational values are put into practice. Thus, it can be understood as a holistic strategy for the whole company and besides, its positive effects go beyond the value creation within the Human Resources division (Stotz and Wedel, 2009, p. 29).

With the existing *War for Talent* on the labour market, a successful *Employer Branding* and communication strategy is becoming more important than ever (Elving et al, 2013, p. 356; Ternès and Runge, 2016, p. 13). The concept of *Employer Branding* is even more essential for smaller companies that are naturally not as visible on the labour market as larger ones. Haag (2021, pp. 420-422) points out that start-ups as new players in the market should not only be well focussed on target-oriented marketing of their products but also of *Employer Branding* in order to attract qualified and talented personnel. A well-defined *Employer Branding* strategy can enable companies to be more attractive on the job market and thus, to have a competitive advantage towards other companies by being able to fill their recruitment needs with desired professionals (Elving et al, 2013, p. 355). Also, Tumasjan, Strobel, and Welpé state: “For start-ups, the challenge of being a new player in the market not only pertains to the marketing of products, but also to the ability to attract qualified and talented personnel” (2011, p. 111). That is why the authors consider *Employer Branding* as an essential instrument for start-ups (Tumasjan, Strobel, and Welpé, 2011, p. 111). A strong *Employer Brand* can support the attraction of talent as well as its retention since other companies are less likely to appear more attractive to talent (Stotz and Wedel, 2009, p. 48). Consequently, to appear as an attractive employer, the development of a long-term and strong *Employer Brand* is essential (Ternès and Runge, 2016, p. 13).

4.1. Internal and External Employer Branding

The responsibilities of *Employer Branding* can be divided into internal and external *Employer Branding* (Stotz and Wedel, 2009, p. 10). Firstly, the former is focussing on one hand on all the instrumental measures taken by HR from the on- until the offboarding of an employee (Stotz and Wedel, 2009, p. 11). These measures include all the products and processes offered by HR as well as the general management of the people and applied leadership styles within a company (Stotz and Wedel, 2009, p. 11). Furthermore, the design of the workplace and offered benefits are central to the wellbeing of employees and thus, to the retention of talent (Stotz and Wedel, 2009, p. 11). On the other hand, the internal *Employer Branding* also focuses on the communication within the company (Stotz and Wedel, 2009, p. 11). Examples of internal *Employer Branding* communication given by Stotz and Wedel (2009, p. 11) are the intranet and internal chat functions as well as physical meeting points such as a coffee station. Moreover, the periodical feedback talks with employees are essential for the communication within the company.

Alongside the internal *Employer Branding*, the external one is focussing on the instrumental measures taken by HR for positioning the brand and connecting it with external stakeholders such as potential employees (Stotz and Wedel, 2009, p. 11). Stotz and Wedel (2009, p. 11) provide examples such as the management of interns and the presentation of the business on fairs or lectures at universities. Further it includes the recruiting process and within it, the creation of a talent pool of fitting candidates (Stotz and Wedel, 2009, p. 11). Besides, the external *Employer Branding* is looking at the communication with potential candidates and the general corporate reputation of the company (Stotz and Wedel, 2009, p. 11). It follows that the internal and external communication and application of *Employer Branding* are important. The internal communication is essential for developing an authentic *Employer Brand* which is lived by a company's employees and thus carried on towards other stakeholders (Stotz and Wedel, 2009, p. 11). External communication is vital for companies to be recognisable as an employer. Hoppe (2018, p. 453) states that although both the internal and external communication of employment benefits are crucial to an organisation's success on the labour market, the latter one has been far more researched in the *Employer Branding* literature. Moreover, although its importance is well-known, active *Employer Branding* is not yet a deeply ingrained part of most businesses (Martin, Gollan, and Grigg, 2011, p. 3633; Ternès and Runge, 2016, p. 4). Thus, despite being in the focus of recent research, the majority of start-ups lack a clearly defined *Employer Branding* strategy (Bittner-Fessler and Nelke, 2021, pp. 138-140; Burkhardt, 2008, p. 5). In addition to that, start-ups and small companies with less well-known products or product brands also find it more difficult to be recognised as a potential employer alongside large corporations that have already well-known products (Stotz and Wedel, 2009, p. 11). Thus, it is hard for them to gain visibility on the labour market compared to large companies (Stotz and Wedel, 2009, 11). A further reason for that can be their lower financial resources compared to large enterprises that are likely to invest into their *Employer Brand*. However, with the age of digitalisation, smaller players also receive the chance to build a strong *Employer Brand* and thus, should take on this chance. Therefore, this thesis is focussing on the potential of external *Employer Branding* in job advertisements of start-ups. Therefore, the next three sections discuss the impact of *Employer Branding* on potential employees. First, *Employer Branding* in relation to organisational attractiveness is addressed. Then the *P-O Fit* as a concept of the *Employer Branding* is introduced and explained. Lastly, the influence of *Employer Branding* in job advertisements is elaborated.

4.2. Organisational Attractiveness

In order to develop a strong *Employer Brand*, an organisation has to create a perception in the pool of job seekers that it is offering a highly desirable work setting (Elving et al, 2013, p. 360). According to Elving et al (2013, pp. 360-61), this idea is closely linked to organisational attractiveness, since an organisation that embodies various attractive characteristics, is most likely to be seen as an appealing employer. Skilled talent is likely to be interacting with the organisation in one way or the other (Elving et al, 2013, p. 358). It can be through personal connections with current employees, by information provided through the organisation's advertisement, website, and public channels or simply "by using its products or services" (Elving et al, 2013, p. 358). Hence, organisational attractiveness in general refers to an individual's perception of an organisation as an appealing entity with which it is desired to establish a connection (Elving et al, 2013, p. 358). In the contextual setting of an organisation as an employer, organisational attractiveness is the measure of how prospective employees see the company as an attractive and favourable workplace (Elving et al, 2013, p. 358). It follows that with growing organisational attractiveness the *Employer Brand* is gaining in influence (Elving et al, 2013, p. 361). And the other way around, with enhanced strategic communication through the *Employer Brand*, personal perceptions of a company are becoming more favourable and organisational attractiveness is increasing (Elving et al, 2013, p. 358).

Like customer brands provide information about various "functional, economic, and psychological advantages" (Elving et al, 2013, p. 360) to customers, also *Employer Brands* signal employees a range of benefits or dimensions of organisational attractiveness (Elving et al, 2013, pp. 360-61). The effectiveness of both types of brands relies on their ability to stand out from others and to draw attention to the offered benefits (Elving et al, 2013, p. 360). The thereby desired long-term impression is established through a company's continuous communication on all available channels (Ternès and Runge, 2016, p. 6).

Besides the formation of a preference within potential candidates, the aspect of differentiation is a main function of an *Employer Brand* (Elving et al, 2013, p. 358; Hoppe, 2018, p. 453; Stotz and Wedel, 2009, p. 31). Throughout the fierce competition on the labour market, potential employees are being overloaded with information by a multitude of employers (Bittner-Fessler and Nelke, 2021, p. 150; Stotz and Wedel, 2009, p. 48). Hence, a major means to differentiate from other businesses is a strong *Employer Brand* (Elving et al, 2013, p. 363; Stotz and Wedel, 2009, p. 48). By differentiation from competitors through emphasising the distinctive facets of the organisation's employment propositions, the company can create a competitive advantage

on the labour market by being the preferred employer (Hoppe, 2018, p. 453; Stotz and Wedel, 2009, p. 31). Hence, it is a major component of success for any company in the *War for Talent*. When formulating an *Employer Branding* strategy, it is further important to take the existing resources of a company into account and to present them in the ‘right light’ (Ternès and Runge, 2016, p. 9).

In summary, from the employee’s perspective, the *Employer Brand* is fulfilling three main functions (Stotz and Wedel, 2009, p. 32). First, a strong *Employer Brand* is giving orientation to potential employees during the job search and choice of employer (Stotz and Wedel, 2009, p. 33). Second, Stotz and Wedel (2009, p. 33) explain that by conveying a key message, an *Employer Brand* is summarising the emotional and functional information and thus, simplifying the decision process of a potential employee. Third, a strong *Employer Brand* is carrying certain associations, which can help a potential employee to assess his professional and cultural fit for the company (Stotz and Wedel, 2009, p. 33). The latter will be more closely explained in the following section.

4.3. Person-Organisation Fit

The *Employer Branding* is aiming to influence the complex process of choosing an employer within current and potential employees (Stotz and Wedel, 2009, p. 30). This process within potential employees starts before the actual search for an employer and can be shaped by first contact points such as employer fairs, word-of-mouth, advertisement, marketing and corporate communication, as well as presence at universities or similar institutions (Stotz and Wedel, 2009, p. 30). During the job seeking process, most prospective employees do not have a substantial volume of information about an organisation even though they might have different interactions with it (Elving et al, 2013, p. 359). Consequently, it is important that an organisation is sending the right signals for job seekers to have a positive image of it (Elving et al, 2013, p. 359). These signals are perceived individually and thus, organisational and job characteristics may play a different role to job seekers. The aim is to be recognised as desirable employer by one’s target group “for providing a high-quality employment experience” (Martin, Gollan, and Grigg, 2011, pp. 3618-19). Consequently, a company has to focus on presenting the specific needs of its target group in order to be perceived as attractive.

With the presented information about “job and organisational characteristics [potential candidates] [...] form an image of how it would be if they were to be part of a particular organisation” (Elving et al, 2013, p. 359). These attributes are thus functioning as signals to create an image of the underlying employment conditions and the work setting at a company (Elving et al, 2013, p. 359). The better defined a company’s characteristics are presented in different touch points, the higher the quality of its applicant pool might be (Stotz and Wedel, 2009, p. 30). Therefore, for potentially fitting talent to choose an employer it requires a well understood and preferred impression of the characteristics of an employer (Stotz and Wedel, 2009, p. 31). Potential employees are comparing “their own values and personalities” (Tanwar and Kumar, 2019, p. 803) with the ones presented within the *Employer Brand* and try to better understand whether there exists a good fit. Depending on the perception of “particular characteristics of the job and the organisation” (Elving et al, 2013, p. 356), job seekers deem a company as an attractive employer or not. Potential candidates are then expected to choose the employer according to the best fit of their individual beliefs, values, and benefits and the ones provided in a workplace (Tanwar and Kumar, 2019, p. 800). It results an anticipated *Person-Organisation Fit (P-O Fit)* which means that the beliefs and interests of a person align with the ones of an organisation (Tanwar and Kumar, 2019, p. 800).

Consequently, to be perceived as a great place to work, there must exist a fit between the prospective employee and the company. A candidate will only identify a *P-O Fit* with the organisation if there is a match between the organisation’s values and provided benefits with the job seeker’s expectations. Furthermore, an *Employer Brand* can signal the important characteristics that influence the decision of a potential employee over the existence of a personal fit between the organisation and him-/herself. Predominantly candidates that see themselves as a *professional and cultural fit* for the employer, are expected to apply then (Stotz and Wedel, 2009, p. 31). This *P-O Fit* can only be achieved if relevant job-choice characteristics are known by the company and communicated with potential candidates (Elving et al, 2013, p. 357). One way of communicating these factors is to mention them in job advertisements as will be discussed in the next section.

4.4. Employer Branding in Job Advertisements

In the pursuit of enabling potential employees to anticipate a *P-O Fit* between themselves and an organisation, job advertisements are essential in the beginning of a recruitment process. Job advertisements are important means to make an *Employer Brand* visible and thus, to enable candidates to evaluate their personal fit with an organisation (Elving et al, 2013, p. 361). Applying successfully *Employer Branding* can provide potential candidates with a valuable understanding of the company and the workplace before working there (Stotz and Wedel, 2009, p. 33). This early understanding of the company's values and culture can further facilitate a candidate's integration process into a new job (Stotz and Wedel, 2009, p. 33).

The effectiveness of *Employer Branding* in that context is to identify the job and organisational characteristics that are most appealing to potential employees and to represent them under the scope of *Employer Branding* through different communication channels to the target group (Boswell et al, 2003, p. 23). Moreover, an authentic *Employer Brand* which is clearly communicated to its target group has great potential for cost reduction within the hiring process by receiving an increased number of applications of fitting candidates as well as by creating value for an employee despite the financial remuneration (Stotz and Wedel, 2009, p. 31).

This thesis is aiming to build on the research of *Employer Branding* in job advertisements. It assesses how start-ups can improve their attractiveness as employer by mentioning certain organisational and job characteristics to engineering professionals in job advertisements. It is important for companies to understand which factors influence the decision of an engineer to apply for a job offer. That is why this study will focus on the concept of *Employer Branding* and on how it can be applied by start-ups in order to attract and incentivise talent to work for them rather than for a large corporation. Therefore, it will discuss the effects of different organisational and job characteristics mentioned in job advertisements on engineers. In order to elaborate which factors have to be mentioned in job advertisements of start-ups, a thorough literature review on STEM recruitment is conducted in the next chapter. Building on the theory and complemented by the literature review, the sixth chapter explains the creation of the hypotheses. The hypotheses are constructed in order to answer the overall research question.

5. Literature Review on the Recruitment of STEM Professionals

To attract the right talent, the offered incentives and compensation in a company have to meet the target group's expectations to an attractive employer (Ternès and Runge, 2016, p. 13). The better a business understands its target group, the better directed the communication of an *Employer Brand* can be and the more fitting the selected employees will be (Ternès and Runge, 2016, p. 13). Consequently, it is important to understand the key benefits and job-choice attributes that matter to the organisation's target group and to communicate them (Bittner-Fessler and Nelke, 2021, p. 150). In order to understand these key factors, in the next paragraph a summary of generally important factors is given. The following two subchapters are then discussing the important job attributes for STEM talent and the attributes of start-ups that are perceived as attractive by STEM talent.

Following the total reward system (TRS) of Peluso, Innocenti and Pilati (2017, p. 311), a sufficient base pay combined with training and development opportunities and a positive work environment are essential for creating an attractive workplace. Also, Greene (2020, p. 17) identifies remuneration and the available prospects of career planning with a focus on personal development opportunities as the major factors for attracting and retaining talent nowadays. Moreover, Haag (2021, p. 424) considers advancement opportunities in the sense of possibilities for personal growth and fulfilment as the central intangible and non-material decision criteria for choosing an employer. Following the author, the succeeding talents of today which were born in the 1980s or 1990s, also referred to as generation Y, expect a challenging work environment in which they can develop new skills (Haag, 2021, p. 424). Lastly, Elving et al found that the mentioning of "organisational climate, development, compensation and innovation" (2013, p. 368) in job advertisements can possibly improve the perceived attractiveness of an employer. Nonetheless, despite its usefulness on the labour market, Elving et al (2013, p. 368) observed that often relevant organisational and job characteristics were not mentioned in job advertisements.

The research of Elving et al (2023) contains two studies. The first one looks at the availability of *Employer Branding* in job advertisements in the Netherlands (Eving et al, 2023, p. 361). The second evaluates the importance of applying *Employer Branding* to job advertisements by an online questionnaire containing a vignette study. The vignette study consisted of two job advertisements for a management traineeship opening, one including *Employer Branding* and the other not (Elving et al, 2023, p. 364). Although this thesis is applying a similar methodology

as the second study of Elving et al (2023), which will be explained in detail in the seventh chapter, the research of Elving et al (2023) is more focused in general on *Employer Branding* in job advertisements. Therefore, this thesis is oriented towards the study of Elving et al (2023), nevertheless, it researches the *Employer Branding* in job advertisements in relation to engineers in Austria and Germany. Thus, this overview gives only a general idea of the job attributes that matter to talent nowadays. Therefore, in the two sections existing literature will be reviewed for organisational and job factors that are deemed as important by STEM talent. After the most important characteristics have been identified, the hypotheses will be constructed based on the theory and the literature review.

5.1. STEM Talent and Important Job Attributes

Wall Bortz et al (2020) shed light on the practices of STEM graduate student recruitment by higher education institutions in the USA. Because STEM talents are highly demanded for the governmental strategy, the pressure on higher education institutions to bring forth the next generation of STEM professionals is high (Wall Bortz et al, 2020, p. 928). As a result, competition between the various institutions for highly qualified STEM graduates for doctoral programmes is very intense (Wall Bortz et al, 2020, p. 928). In the pursuit of attracting STEM talent, the higher education institutions mostly compete on financial benefits which however are limited for them (Wall Bortz et al, 2020, pp. 942-43). Nevertheless, the findings of Wall Bortz et al (2020, pp. 929, 931, 947) suggest that there are also other components that can attract STEM graduate students. These are especially interesting since also start-ups are unable to offer similar salaries to large corporations. Naturally, the attractiveness of these factors is contingent upon the individual's personal background and current life phase (Wall Bortz et al, 2020, pp. 930-31). Nevertheless, there are certain organisational and job characteristics that are considered by most STEM graduates as attractive. Following the findings of Wall Bortz et al (2020, pp. 931; 945-46), the financial package is highly important but not the only relevant factor influencing the decision-making process of STEM graduates, unless the financial offers are differing drastically from other institutions. In the study of Wall Bortz et al (2020), the focus is on identifying the other factors that matter to STEMs and can make up for a lower financial offer. In other words, to complement the job offer with other than financial benefits. In order to identify the important factors, the authors conducted interviews with the leaders of STEM graduation programmes as well as with STEM students at several U.S. universities (Wall Bortz et al, 2020, pp. 933-34). Moreover, the study contained a questionnaire (Wall Bortz et al, 2020,

p. 934). To begin with, to be able to develop in a certain area within the institution because of its academic ranking and experience is an important factor for graduates (Wall Bortz et al, 2020, p. 946). Thus, to increase resources for the overall research programme rather than raising salaries has been noted as a means to increase organisational attractiveness of the higher education institutions (Wall Bortz et al, 2020, p. 946). Moreover, the team climate and relationships with faculty members influences the decision for an institution substantially (Wall Bortz et al, 2020, p. 946). Finally, Wall Bortz et al (2020, p. 947) recommend providing social support as well as support for development to students in order to improve their overall experience. This in turn could benefit the institutions also in the long-term because graduate students might become ambassadors of the programmes and recommend it to other graduates (Wall Bortz et al, 2020, p. 947).

Furthermore, Gurtner, Kels, and Scherrer (2017) conducted a study on the expectations of STEM professionals to a workplace. The research was carried out in Switzerland in 2014 by sending out online questionnaires to organisations with employees employed in the STEM field (Gurtner, Kels, and Scherrer, 2017, p. 175). Following the findings of Gurtner, Kels, and Scherrer (2017, p. 176), STEM graduates and talents are predominantly looking for a workplace in which the job content is engaging. To make use of their skills and competencies and to have room for developing them further while taking on interesting work tasks is highly desirable for them (Gurtner, Kels, and Scherrer, 2017, p. 176). Alongside it goes the possibility of assuming responsibility (Gurtner, Kels, and Scherrer, 2017, p. 176). Moreover, also good career prospects and the promotion of their professional careers are important expectations for STEM professionals towards their workplace (Gurtner, Kels, and Scherrer, 2017, p. 176). Besides, the availability of information on decision-making as well as the ability to participate in the sense of expressing one's opinion is deemed as important factor for STEM graduates as well as for specialists (Gurtner, Kels, and Scherrer, 2017, p. 176). Furthermore, the loyalty of the employer and the feeling of belonging are expected by STEM professionals when choosing an employer (Gurtner, Kels, and Scherrer, 2017, p. 176). Lastly, it is important for them that personal achievements are recognised in some way (Gurtner, Kels, and Scherrer, 2017, p. 176). This recognition can take place through career advancement which is expected by most STEM professionals (Gurtner, Kels, and Scherrer, 2017, p. 176). Moreover, also a performance-related salary, at least partly, is considered by half of them as interesting mean of recognition (Gurtner, Kels, and Scherrer, 2017, p. 176).

Moreover, DeFraine, Williams, and Ceci (2014) conducted two studies to elaborate which type of workplaces STEM students prefer in laboratories. The first one was carried out with professors from STEM fields at U.S. universities and the second one with STEM graduate students (DeFraine, Williams, and Ceci, 2014, pp. 2-4). The participants were asked to fill in a survey before they watched two videos illustrating different types of workplaces. After watching the two videos, respondents were asked to fill in another survey about the videos (DeFraine, Williams, and Ceci, 2014, p. 4). They found that when it comes to the ideal level of work/life balance and the structure of the workplace, today's young STEM talent has different attitudes, values, and preferences than their predecessors (DeFraine, Williams, and Ceci, 2014, p. 1). To begin with, DeFraine, Williams, and Ceci (2014, pp. 1-2) found that having the appropriate balance between work and non-work domains is essential for STEM professional. This can be for example achieved by flexible working schedules that enable individuals to also pursue obligations outside of their work (DeFraine, Williams, and Ceci, 2014, p. 1). Furthermore, the collaboration between employees and the achieving of goals in a group are highlighted as important by the study of DeFraine, Williams, and Ceci (2014, p. 6). The collaborative environment enhances the "*sense of belonging* and the *desire to participate*" (DeFraine, Williams, and Ceci, 2014, p. 6). Besides, work-life balance increases as team members can coordinate their tasks together and thus, improve individual flexibility (DeFraine, Williams, and Ceci, 2014, p. 1). Moreover, the work and non-work domains becoming less separated for STEM professionals because they make use of services for nonwork domains (sport, health, beauty, ...) provided by workplaces (DeFraine, Williams, and Ceci, 2014, p. 2). Thus, DeFraine, Williams, and Ceci (2014, p. 2) conclude that the subsequent STEM talents favour the merging of their personal lives and work in a work setting that offers collaboration and flexibility.

In summary, there are several factors that are deemed as important by studies with STEM students and professionals. The next section will focus on the job attributes that have been identified by other studies as distinctive characteristics of start-ups and that are perceived as attractive by STEM talent.

5.2. Attractive Characteristics of Start-ups

According to the Austrian employer rating platform *Kununu*, the best rated employers in Austria and Germany in 2023 are all large companies (Kununu, no date-a; Kununu, no date-b). That is because large corporations already have at their disposal a long catalogue of benefits resulting

in them being an attractive employer able to retain and attract talent (Haag, 2021, p. 421). Roach and Sauermann (2023, p. 1) note that despite higher salaries, increased job security, and more diverse benefit packages large and established companies offer also enhanced complementary resources to employees. Nevertheless, despite financial shortcomings the possibilities of talent attraction for small and medium-sized enterprises are not to be underestimated (Haag, 2021, p. VIII). Their characteristic differences compared to large corporations can present their main competitive advantages on the labour market (Haag, 2021, p. VIII; Roach and Sauermann, 2023, p. 2). A considerable part of people is willing to work for a start-up because of its distinctive organisational and job attributes in comparison to the characteristics of established organisations (Roach and Sauermann, 2023, p. 2). Roach and Sauermann (2023, p. 5) suggest that certain skilled candidates highly value various job characteristics next to the salary when considering a job offer. These individual preferences for certain organisational and job characteristics allow start-ups with less financial resources to compete with large and incumbent companies.

The authors conducted a longitudinal study on doctoral students in science and engineering from 39 U.S. universities (Roach and Sauermann, 2023, p. 8). Over the period of six years PhD students were contacted to fill in two online surveys. The first survey had to be filled in by respondents while being a doctoral student (Roach and Sauermann, 2023, p. 8). The second was sent once the respondents had graduated from university and was employed full-time in an organisation (Roach and Sauermann, 2023, p. 8). Thereby they have found “that students expect significant differences between startups and established firms with respect to pay, R&D resources, job security, autonomy, and intellectual challenge” (Roach and Sauermann, 2023, p. 12). These expected differences are in coherence with the attributes corresponded with either start-ups or large companies (Roach and Sauermann, 2023, p. 12). Thus, PhD candidates in the fields of science and engineering assign particular characteristics to start-ups and the existing work environment in there (Roach and Sauermann, 2023, p. 12). Moreover, Roach and Sauermann (2023, p. 15) find that certain types of STEM PhD graduate students are significantly more attracted by the possibility of being employed by a start-up.

The findings illustrate that the science and engineering PhD students who understand themselves as more willing to tolerate risk, prioritise autonomy, and report a keen interest in turning an innovation, product, or technology into a marketable and profitable commodity, are also more inclined to join a start-up (Roach and Sauermann, 2023, p. 14). In contrast, the PhD candidates which show “a stronger preference for managerial activities” (Roach and

Sauermann, 2023, p. 14) are less inclined to do so. The different characteristics attributed to start-ups are valued differently by the STEM doctoral students (Roach and Sauermann, 2023, p. 16). Whereas start-ups choose the candidates that report the most fitting skill sets, candidates themselves are assumed to “self-select into applying to startup jobs based primarily on preferences” (Roach and Sauermann, 2023, p. 16). The assumed benefits of start-up employment important to these candidates are likely to be non-monetary and further, to offset lower salaries paid by start-ups (Roach and Sauermann, 2023, pp. 17, 22). According to the authors, STEM doctoral students are highly attracted to the innovative technology that they can support to develop in a start-up (Roach and Sauermann, 2023, p. 21). The authors found that highly skilled STEMs employed in young technology start-ups receive on average a 16% lower salary than their counterparts employed in incumbent firms (Roach and Sauermann, 2023, p. 18). This proves that the scarce availability of resources reflects directly on lower salaries for employees (Roach and Sauermann, 2023, pp. 17-18). Despite highly skilled engineering and scientific professionals accepting lower salaries in start-ups, it cannot be dismissed the possibility that they do so because of expecting higher prospective financial remuneration (Roach and Sauermann, 2023, p. 19).

According to Gwynne, nowadays it becomes appealing for a growing number of STEM graduates from the MIT and other highly ranked universities in the United States “to start their career journeys with start-ups and small but growing high-tech firms that offer them the chance to develop new technology likely to have an immediate impact on the market” (2012, p. 7). While large corporations like *IBM*, *Microsoft* or *Google* remain the top employers on the labour market for STEM, small and fast-paced companies earn growing attention from graduates (Gwynne, 2012, p. 7). Whereas the work in large corporations is marked by slower processes and consequently, a slower pace of innovation, start-ups can persuade with the possibility of working firsthand on technological innovations in a fast-paced setting (Gwynne, 2012, p. 7). Being directly involved in the development of new technologies and further, to grow in a challenging work setting is what STEM graduates are increasingly looking for in the beginning of their careers (Gwynne, 2012, p. 7). Gwynne (2012, p. 7) states that personal fulfilment is a key word here.

Lastly, Tumasjan, Strobel, and Welpe (2011) performed a study on the organisational and job characteristics that start-ups should implement in their *Employer Brand*. A conjoint analysis with STEM students and graduates from two German universities had been carried out to answer their research question (Tumasjan, Strobel, and Welpe, 2011, pp. 117 - 18). First an

extensive literature review on small firms' attractive job factors was performed (Tumasjan, Strobel, and Welp, 2011, p. 117). Based on the seventeen identified organisational and job factors, interviews with experts that had "either practical or scholarly experience in the area of recruiting employees for start-up ventures" (Tumasjan, Strobel, and Welp, 2011, p. 117) were conducted. Following the interviews more factors were added to their list and after a further validation step with experts, nine characteristics were presented in the results of their study (Tumasjan, Strobel, and Welp, 2011, pp. 117 - 18). Following the findings of Tumasjan, Strobel, and Welp (2011, pp. 121-23, 127), the team climate, i.e. a positive and shared environment within a team, is the most important job factor of start-ups for STEM students and recent graduates. Secondly, to receive responsibility and autonomy (empowerment) at a relatively early stage in their career is deemed as an attractive job attribute (Tumasjan, Strobel, and Welp, 2011, pp. 123, 127-28). Thirdly, STEM talents value the self-determined and flexible allocation of their working time, thus the flexibility of the working schedule is considered as an attractive job attribute (Tumasjan, Strobel, and Welp, 2011, pp. 123, 128). Moreover, the authors note that another interesting characteristic of start-ups is their innovative and agile working environment that gives employees the opportunity to take on leadership functions in the beginning of their careers (Tumasjan, Strobel, and Welp, 2011, p. 128). Besides, the existence of flat hierarchies is positively influencing the job-choice decision of talent to work in a start-up (Tumasjan, Strobel, and Welp, 2011, pp. 123, 128). Lastly, to have a steep learning curve on the job is valued by STEM students as an attractive and distinctive job attribute of start-ups (Tumasjan, Strobel, and Welp, 2011, pp. 123, 128).

To sum it up, there exist organisational and job factors next to financial remuneration and monetary benefits that are likely to influence the decision-making of engineers in the process of choosing an employer (Wall Bortz et al, 2020, p. 946). Latest research emphasises that certain types of STEM professionals have a better *P-O Fit* with start-ups due to specific organisational and job characteristics attributed to them (Roach and Sauermann, 2023, p. 2). These differences in personal preferences also enable start-ups to compete with incumbent and larger companies despite the offering of lower wages (Roach and Sauermann, 2023, pp. 2, 19). The distinctive characteristics of start-ups attract certain types of engineers and can compensate for the lower salaries. Therefore, despite of start-ups reporting of lower financial resources, it is expected that they can attract top engineering talent when applying *Employer Branding* in their job advertisements. Based on the literature review, five hypotheses are proposed in the upcoming chapter.

6. Research Question and Hypotheses

As elaborated further above, organisations are perceived as more attractive when *Employer Branding* is applied (Elving et al, 2013, p. 364). Pointing out specific organisational and job factors in job advertisements facilitates the revealing of an *Employer Brand* to potential employees (Elving et al, 2013, p. 361). Consequently, it enhances the identification of a fitting employer for themselves, the identification of a *P-O Fit* (Elving et al, 2013, p. 364). Therefore, it is important for (technology) start-ups to understand which factors influence the decision of an engineer to apply for a job offering.

This master thesis suggests that if certain organisational and job characteristics are signalled through the *Employer Brand* in job advertisements, engineers will perceive a start-up as a more attractive employer. Consequently, for start-ups it is important to find a package that is fitting the core of their business (Haag, 2021, p. 422). Identifying thereby the characteristics and values that differentiate them from large corporations and make them appear as an attractive employer to engineers is essential. Thus, this thesis aims to answer the following research question:

Under which conditions would an engineer choose to work for a start-up rather than for a corporation?

Thereby, this thesis is seeking to explore which job-choice characteristics are relevant for start-ups to be mentioned in the *Employer Brand*. Its findings should build on the research of *Employer Branding* in job advertisements and help start-ups to attract engineering talent.

Based on the findings in the literature review the following five hypotheses were elaborated. First, the innovativeness of start-ups is not only important for the economic growth but also enables employees to work on engaging job content. STEM professionals who are eager to develop innovative and new technology are also more inclined to work in a start-up (Gurtner, Kels, and Scherrer, 2017, p. 176; Gwynne, 2012, p. 7; Roach and Sauermann, 2023, pp. 14, 16). Consequently, the first hypothesis appears reasonable:

H1: Stating the opportunity to work in an innovative environment with cutting-edge technology in job advertisements increases the attractiveness of a start-up as an employer.

Based on the findings of Wall Bortz et al (2020, p. 946), it is expected that STEM graduates and professionals will find an organisation more attractive when offering developmental opportunities. The development of skills and competencies in a certain area and the opportunity to have a steep learning curve are deemed as important for STEM talent, especially in the beginning of their career (Gurtner, Kels, and Scherrer, 2017, p. 176; Gwynne, 2012, p. 7; Haag, 2021, p. 424; Tumasjan, Strobel, and Welpe, 2011, p. 128; Wall Bortz et al, 2020, p. 946). Since (technology) start-ups are founded to develop and work on cutting-edge technology, it is expected that engineers that want to further develop new skills and competencies will perceive the job advertisement of a start-up as more attractive. Therefore, start-ups are likely to be attractive to young STEM talent that is aiming to grow in a challenging environment and thus, to promote further their career (Gurtner, Kels, and Scherrer, 2017, p. 176). It follows the proposition of the second hypothesis:

H2: Stating the opportunity to advance and develop skills and competencies in a challenging work setting in job advertisements increases the attractiveness of a start-up as an employer.

Due to their innovative and agile work environment as well as the smaller size and young age, start-ups report flatter hierarchies compared to established corporations (Roach and Sauermann, 2023, p. 4; Tumasjan, Strobel, and Welpe, 2011, pp. 112, 128, 130). Moreover, due to the size and needs of start-ups, employees' roles are likely to be defined broader. Typically, employees take on wide-ranging responsibilities and in order to develop innovative and novel services, products as well as business models they collaborate extensively with other employees (Zhou, 2020, p. 319). Therefore, the roles of employees are more intertwined with other employees. Consequently, a start-up environment allows more collaboration between employees while working on a shared aim. Furthermore, following the previous literature review it is expected that a positive and shared environment with co-workers will enhance the attractiveness of start-ups (DeFraine, Williams, and Ceci, 2014, p. 6; Tumasjan, Strobel, and Welpe, 2011, p. 127; Wall Bortz et al, 2020, p. 946). Thus, the third hypothesis seems plausible:

H3: Stating a positive and collaborative team climate in job advertisements increases the attractiveness of a start-up as an employer.

Alongside with a challenging work setting and flat hierarchies goes the empowerment of employees. The innovative environment with fewer (financial) resources is demanding from employees to take on responsibilities and to work autonomously from the very beginning.

According to Tumasjan, Strobel, and Welp (2011, pp. 127-28) this factor is considered as beneficial by STEM talent because it facilitates the development of competencies and skills. Also, Roach and Sauermann (2023, p. 14) find that STEM graduates that deem autonomy as important job attribute will prefer working for a start-up. Therefore, we arrive at the fourth hypothesis:

H4: Stating the receiving of autonomy and responsibility in job advertisements increases the attractiveness of a start-up as an employer.

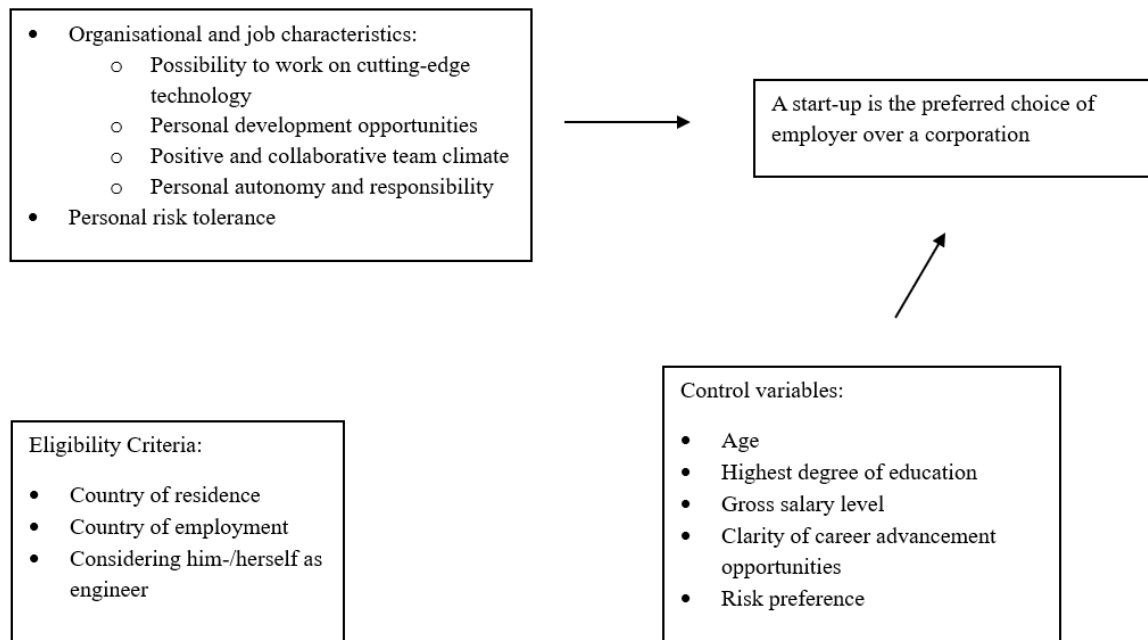
Lastly, as elaborated earlier start-ups face a significantly higher risk than incumbent firms (Zhang, 2021, p. 3). Consequently, “established firms offer greater job security, whereas startup employees face greater career risk due to their employers’ higher likelihood of failure” (Roach and Sauermann, 2023, p. 4). Thus, jobseekers associate start-ups with lower job security compared to the higher job security offered in large corporations (Roach and Sauermann, 2023, p. 4). Therefore, Roach and Sauermann (2023, p. 14) argue that engineers that choose to work for a start-up, should not be risk-averse but rather have a stronger toleration towards risk. Therefore, following hypothesis seems reasonable:

H5: The greater the tolerance of engineers to accept a higher level of risk in terms of job and income security in order to work on an innovative project, the more attractive start-ups are perceived to be.

Based on the theoretical framework given by the *Employer Branding* and *P-O Fit* theory and the review of recruitment literature on STEM, the five hypotheses have been constructed. In regard to the hypotheses, the following analytical framework shown in figure 1 on the page that follows has been developed by the author. It illustrates the proposed relationship between the independent variables and the dependent variable, which will be explained in more detail further down.

The upcoming chapter describes in detail the applied methodology of the study. The methodology aims to measure the impact of the four organisational and job factors and the personal risk tolerance of an engineer on *the Preferred Choice of a Start-up as Employer over a Corporation*.

Figure 1 Analytical Framework



7. Methodology

As discussed in the beginning, start-ups are central in answering our current challenges caused by global warming, demographic changes, and ongoing technologisation. Despite their importance, the building of a strong team is complicated by their strong vulnerability, high financial risk, and their youthful existence. This master thesis wants to explore how start-ups can attract high-skilled engineers regardless of lower financial resources. In the pursuit of answering the research question and thus, testing the developed hypotheses, the quantitative research methodology has been applied.

7.1. Research Design

The quantitative method has been chosen since it allows a less biased exploration of the research question. Thereby, the non-experimental data collection has been selected because it is a common approach in social sciences and economics (Stoetzer, 2017, pp. 10, 115). Furthermore, the applied research design was a survey, more specifically an online questionnaire. By conducting the research online, it allowed access to a broad pool of engineers in Austria and Germany. The questionnaire has been sent out for 42 days in 2024 between April 19th and May 30st to engineers found and contacted directly via the professional networking site *LinkedIn*. During these six weeks around 1100 engineers have been personally messaged by the author. Since *LinkedIn* restricts the sending of connection requests to approximately 100 profiles per week, it required several weeks to reach a broad pool of engineers (Choi, 2024; LinkedIn, no date). Nevertheless, following the advice of the professional *Tim Schmaddebeck*² the weekly limit can be extended to around 180-200 by sending connection requests three times a week with one day break in between the first two times. For example, the first requests are sent on Tuesday, the second on Thursday and the third on Friday or Saturday. On the first two days, around 80-90 invites per day have been sent out. On the third day, up to 20 invites have been allowed to send out before the network ceased the option of sending requests until the beginning of the following week (LinkedIn, no date). Taking time restraints into consideration, the data collection was ended after six weeks once the initial aim of 200 persons taking the survey was achieved. The survey period ended with 216 responses out of which 85 had to be excluded.

² Tim Schmaddebeck is the CEO and founder of the company *Mentorwerk*, which is focusing on career coaching for engineers. He specialises also on topics such as building a professional network via the platform *LinkedIn*.

Consequently, it remained a dataset with 131 completed records which has been used as the basis for the analysis. It will be explained in more detail in the subchapter 7.3.

The questions included in the survey have been developed with the help of a selection of the secondary literature. The questionnaire was created using the online survey tool *SoSci Survey* and sent combined with a short message to engineers on *LinkedIn*. The procedure was as follows. First, so-called search filters were used to search for a random selection of engineering profiles on the professional platform *LinkedIn*. Following search filters have been applied:

- “Ingenieur”
- “Bachelor of” AND “Engineer”
- “Master of” AND “Engineer”
- “Bachelor of” AND “Ingenieur”

In the next step, the shown profiles have been filtered to the locations Austria and Germany. Following each search, 100 pages of results each displaying 10 profiles were shown by *LinkedIn*. By a right click on each profile, the profiles have been opened in a new window. Since it is not possible to write a message to foreign profiles, every profile was sent a connection request which included following message:

“Hi [Name],

I am looking for engineers who would like to answer my questionnaire for my Master's thesis at the University of Vienna.

It will take between 5-10 minutes and your data will be treated confidentially.

The survey: <https://www.soscisurvey.de/engineers/>

Thank you for your support! 😊

Lena”

The message had to be kept short, since only 300 letters or signs are allowed by *LinkedIn* to be sent with a networking request. The following sections will explain in more detail the online questionnaire that has been sent out to engineers.

7.2. The Online Questionnaire

The survey which can also be found in the Appendix A of this master thesis consists of 27 questions aiming to answer the research question. Moreover, an additional question for optional feedback is accessible at the end of the survey. The questionnaire is structured in six parts as follows: Introduction to the survey, assessment of the eligibility criteria, understanding of the importance of organisational and job characteristics, vignette study with a comparison of fictional *Firm A* and *Firm B*, sociodemographic characteristics, feedback and closing.

In the survey, the answer options of 16 questions were formed on a 7-point Likert scale that aimed to test the personal importance and preference for the presented organisational and job characteristics as well as the personal risk tolerance. All the other questions were given multiple predefined answering options. Some offered the option to state “other”. Only the last question, namely the feedback on the survey, allowed an open answer field.

7.2.1. Eligibility Criteria

To start with, in the first two questions of the survey the respondents had to report their country of residence and their country of employment in either Austria or Germany. Besides the requirement of being resident and employed in either Austria or Germany, another eligibility criterion was included in the beginning of the survey. Namely, whether the respondent considers himself as an engineer. The respondents that either answered with living or being employed in another country than Austria or Germany as well as respondents that did not consider themselves as engineers were directly forwarded to the end of the survey. These cases were deleted from the dataset in the end of the survey period.

7.2.2. The Importance of Organisational and Job Characteristics

The various organisational and job characteristics that have been identified as important in the STEM recruiting literature were included in the questionnaire in two ways. First of all, the personal importance for each item has been queried. In the next part, two vignettes which where exemplary job advertisements for corporations and start-ups were displayed. Both of them referred to the depicted organisational and job characteristics. The individual importance of these characteristics was assessed using rating scales, since they are considered as one of the most frequently used instruments in social science data collection (Menold and Bogner, 2015, p. 1). By applying 7-point rating scales, participants have been able to evaluate the importance

of these characteristics by stating how much they agree with each statement. Rating scales with between five to seven categories are deemed commonly as optimal measurements with respect to reliability, validity, and degree of differentiation (Menold and Bogner, 2015, p. 2). Although recent studies point out the advantages of rating scales with more than seven categories, this research design is applying rating scales with 7 categories in accordance with the majority of research (Menold and Bogner, 2015, p. 2).

To measure the importance of each organisational and job factor, the questions have been followed by a 7-point Likert scale. The categories have been fully verbalised to improve the reliability of the measurement as well as the clarity for respondents (Menold and Bogner, 2015, pp. 2-3). The 7-point Likert scale consists of the same amount of negative and positive or disagree and agree categories as well as one category that is in the middle. The employed 7-point Likert scale and its categories build a continuum ranging from a low to a high level (Menold and Bogner, 2015, p. 3). Thus, the categories range from the negative to the positive categories and are shown horizontally in the questionnaire: Strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree. Thus, the categories are fulfilling the requirements by being clearly defined and commonly understood (Menold and Bogner, 2015, p. 3). Further, they are balanced between negative and positive categories and the intervals between them are equal (Menold and Bogner, 2015, p. 3).

It has been found that the middle category can dilute the data because it allows respondents to not answer as clearly for one direction as they would if there was not offered a middle category (Menold and Bogner, 2015, p. 5). Nevertheless, by leaving out the middle category it would not allow respondents to express their medium agreement (Menold and Bogner, 2015, p. 5). The research recommends including a middle category in order to improve reliability and validity of the results (Menold and Bogner, 2015, pp. 5-6). Consequently, the middle category has been included in the rating scale.

Moreover, Menold and Bogner (2015, p. 8) point out that the 7-point Likert scale ranging from disagreement to agreement might influence the results. The authors suggest using a direct rating scale that allows respondents to rate the importance of the item directly, i.e. ranging from “not important at all to me” to “very important for me” could be more beneficial than agree-disagree scales (Likert-type). Nevertheless, to facilitate the understanding of the survey to respondents, the same Likert-type has been used throughout the survey. To avoid the question has not been allowed in the rating scales but only for the sociodemographic questions.

7.2.3. The Vignette Experiment

As mentioned further above, the third part of the questionnaire included a vignette experiment. According to Steiner, Atzmüller, and Su, “[i]n particular, vignette experiments embedded in surveys—also called factorial surveys—are now becoming more popular” (2017, p. 52). The vignette experiment consisted of two text vignettes which were extracts of two fictional companies’ job advertisements. The vignettes served exemplary for job advertisements of start-ups and large companies. While the job advertisement of *Firm A* represented the start-ups, the job advertisement of *Firm B* represented the corporations. The aim of the vignette experiment in the survey was to understand the attitude of the respondents towards the presented organisational and job characteristics within job advertisements. This allows to test the hypotheses with “corresponding questions [that] are embedded in a concrete, realistic context” (Steiner, Atzmüller, and Su, 2017, p. 53). However, the respondents could not know which type of company was presenting itself.

The vignettes have been built manually by the author upon job advertisements that resulted from an online research of current job advertisements for engineers published by start-ups and corporations in Austria and Germany on the 7th and 8th March 2024. For each organisation type, start-up and corporation, 20 job advertisement have been screened. Any factor that was related to the identified organisational and job characteristics and to describing the company has been copied into the vignette. The aspects related to the identified job and organisational characteristics as well as the most frequently used terms in the job advertisements of start-ups in Austria and Germany have been collected and combined in the exemplary job advertisements. Once all points for the fictional job advertisements have been collected, the terms for each factor have been rated according to how frequently they got mentioned. The most frequently mentioned ways of saying have been used for the vignettes of each type. The wording is thus a result of the mixture of different start-ups’ and corporations’ job advertisements. The vignettes were clearly created with a focus on including the four factors for testing the hypotheses, nevertheless, also other points such as home office or other factors have been included when mentioned frequently in the real job advertisements. Thereby the more often one of these benefits has been mentioned, the higher its standing in the listing in the job advertisement. This allowed the vignettes to be very close to reality and at the same time to include the tested factors.

For both vignettes the same number of paragraphs (five) has been used to avoid influencing decision-making by design. Moreover, also the same amount of bullet points, namely nine, has been included in the job advertisements. As a consequence, the vignettes are similar in their visual appearance. The first vignette (*Firm A*) consists of 231 words while the second (*Firm B*) is made of 254 words. The following eight questions queried the attractiveness of each job advertisement in regard to the depicted job and organisational factors. Thereby participants had to rate their preference between the two companies' job adverts on a 7-point Likert scale for each factor. Moreover, this part included the attention question which required participants to select "strongly disagree". Lastly, a question concerning the overall preference or indifference towards *Firm A* or *Firm B* has been included.

When creating the fictional job advertisements, an interesting observation was that many start-ups did not offer any information on the working environment on their website but focused merely on the presentation of their technology and product or service. Thereby, the start-ups that were actively searching for talent, introduced the company by emphasising specifically the technology they were working on, their sustainable goals and/or their innovative team.

7.2.4. The Sociodemographic Characteristics

In the end of the survey, respondents were asked to first state the gender they identify with and to enter their age. For the age, no predefined groups were given, since it makes it easier to compare the average age as well as selecting age groups afterwards and compare them to German and Austrian research. Moreover, the items parenthood, nationality, highest level of education, the hierarchical level in the company, and the monthly gross salary were queried. Since the stating of salaries is often seen as highly confidential, this question has been displayed in salary groups ranging from less than €3,000 up to €5,000 or more. Further, the participants were able to choose that they do not wish to answer the question.

For the reason that the focus of this study is on engineers, two questions in the beginning of the survey had been included to understand whether the participants were engineers. The term engineer refers to "a person who uses scientific knowledge to design, construct, and maintain engines and machines or structures such as roads, railways, and bridges" (Collins, no date). Thereby, engineers are aiming to find solutions for technical problems and are developing new technologies (Ingenieurwesen-studieren.de, 2024). There exist five main branches of engineering which themselves include several subgroups (Embry, 2024; National University,

2024). Therefore, this definition is more general but not describing the differing nature of tasks in various branches of engineering. Nevertheless, the study is working with the common categorisation that divides engineering into five fields, namely: Civil engineering, mechanical engineering, electrical engineering, chemical engineering, and industrial engineering. Subgroups of these superordinate categories are for example structural engineering, environmental engineering, aerospace engineering, marine engineering, automotive engineering, information technology engineering, computer engineering, pharmaceutical engineering, biochemical engineering or supply chain engineering (National University, 2024). Also Wall Bortz et al deemed civil engineering, mechanical engineering, electrical engineering and chemical engineering as “the largest programs in engineering” (2020, p. 934). Thus, it made sense to include these for disciplines complemented by industrial engineering.

In the survey the respondents were able to choose one of the five superordinate categories or to state another field of engineering in a blank field. While software engineering is a growing field of electrical engineering, it has been left out in the search for engineers on *LinkedIn*. This is due to the difficulty of differentiating it from software programmers, since the terms are often used interchangeable. Whereas in the common language it is likely to be made no difference between a software engineer, a software programmer, or a software developer, the work itself differs in its nature. Moreover, it is likely to require a different path of education (Heinz and Velazquez, 2022). To ensure a more homogenic sample group of engineers, profiles with the term software engineering in their *LinkedIn* profile headline were not contacted. This does not necessarily mean that no software engineers have been included but it reduced the probability of including developers or programmers in the survey. In a second step, the respondents’ own definition of themselves was used to understand whether they consider themselves as engineers by including the following question at the beginning of the survey as an eligibility criterion: “Do you consider yourself an engineer?”. Respondents that declined this question were automatically forwarded to the closing of the survey and their answers have not been saved. As explained above, the respondents that considered themselves as engineers were then asked in the sociodemographic part of the survey to which of the five engineering fields or another, they counted themselves.

7.3. The Sample

In a regression model with five independent variables, a sample size of minimum 36 completed responses is recommended (Stoetzer, 2017, p. 198). As mentioned further above, 131 respondents of the 216 people that took the survey were contained. Seven cases had to be deleted because the respondents did not meet the eligibility criteria of being resident and working in either Austria or Germany and of considering themselves as an engineer. Out of the remaining 209 cases, 60 had to be excluded since they were incomplete. Lastly, 18 cases were removed due to incorrect answers in the attention question. Consequently, the sample remained with 131 valid responses.

Out of the 131 respondents, 16 (12.21%) and 115 (87.79%) were living in Austria and in Germany respectively. Moreover, 17 participants (12.98%) were employed in Austria while 114 (87.02%) were employed in Germany. Examining the dataset demonstrates that one male participant entered in the survey that he was living in Germany, likely to be living close to the Austrian border, and working in Austria. When comparing the population sizes of Austria and Germany, it is plausible to explain the strong difference in number of respondents from each country represented in the dataset. While in Austria the population consists of approximately nine million people, in Germany it is about 83 million. In simple terms it can be expected that around 90% of the survey respondents would be living in Germany and close to 10% in Austria. Therefore, the sample is close to the expected results. The slightly higher proportional percentage of participants who are living in Austria may be explained by the author's own residency in Austria. It is likely that the algorithm of *LinkedIn* also presented the author with proportionally more Austrian profiles in the search due to personal network connections.

Moreover, table 1 illustrates the gender distribution of the sample. It shows that out of the 131 respondents 104 were men. Another 26 female respondents and one diverse participant answered the survey completely.

Table 1 Gender Distribution

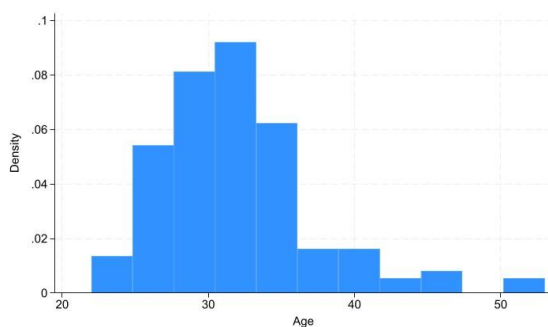
Gender	Freq.	Percent	Cum.
Female	26	19.85	19.85
Male	104	79.39	99.24
Diverse	1	0.76	100.00
Total	131	100.00	

A result of 79.39% male and 19.85% female participants is not surprising and goes hand in hand with the figures of gender distribution in STEM professions in Europe (Blumberg et al, 2023; Garcia-Holgado et al, 2020, p. 215; Piloto, 2023).

Furthermore, 95 respondents (72.52%) indicated they were German, and seven respondents (5.34%) were Austrians. Besides, five participants were from India, four from Iran, three from Turkey, and two from Hungary. One respondent each from Bosnia and Herzegovina, Brazil, China, Cyprus, Czech Republic, Egypt, Italy, Lithuania, Mongolia, Poland, Romania, Russia, Spain, Venezuela, and Yemen answered the questionnaire. As explained above, all these respondents lived and worked in either Austria or Germany when taking the questionnaire.

Moreover, figure 2 illustrates the age distribution. The distribution is skewed to the right, with its tail extending towards the older age groups, while the mode of respondents is in the younger age groups. In fact, the majority of the participants is in their late mid-twenties and early mid-thirties. Nevertheless, untypically for a right-skewed distribution, the median is higher than the mean. Namely, the median of the age in the sample is 32 years while the average age (mean) is around 28 years. Therefore, the age distribution is not strictly right-skewed.

Figure 2 Age Distribution



The high density of respondents between the ages of 25 and 35 years corresponds with the age demographics of the user groups on the professional networking site *LinkedIn* (Dixon, 2024). According to a study of the platform *Statista*, in 2024, half of the “LinkedIn users worldwide were between the ages of 25 and 34 years old” (Dixon, 2024). The dominance of younger ages in the dataset is therefore likely to be explained by the mode of survey recruitment via the platform *LinkedIn*. Corresponding with the young age distribution, only 35 respondents (26.72%) indicated they were a parent while the other 96 participants (73.28%) were not a parent.

Moreover, the majority of those surveyed saw themselves as belonging to one of the five main fields of engineering. With 47 respondents (35.88%) stating that they worked in the mechanical engineering field, it forms the largest group. Moreover, nine respondents (6.87%) indicated that they are employed in civil engineering, eight (6.11%) in chemical engineering, 20 (15.27%) in electrical engineering, and 22 (16.79%) in industrial engineering. Besides, 25 participants (19.08%) stated that they were working in another field. Other fields mentioned were mechatronics, data and electrical engineering, quality engineering, automotive engineering, aerospace engineering, intralogistics, medical engineering, environmental engineering, biomedical engineering, metallurgical engineering, water engineering, process engineering, and software engineering. All of these fields, however, can be regarded as subgroups of the five main fields of engineering.

When looking towards the salary distribution of the sample, the smallest number of respondents, namely five (3.82%), stated that they earn less than €3,000. Moreover, ten respondents (7.63%) answered that they have a gross salary between €3,000 and €3,999. A gross salary between €4,000 and €4,999 was chosen by 37 participants (28.24%). The great majority, namely 69 of the participants (52.67%) indicated that they earn €5,000 or more. Another ten respondents (7.63%) chose not to share their salary in the questionnaire. Consequently, over 80% of the respondents reported higher salary levels, with a significantly smaller number of respondents earning in the lower salary categories. The salary distribution of the sample is therefore left-skewed. Since more than half of the participants chose the highest category with a salary of €5,000 or more, it is likely that the range of gross salaries presented in the categories of the respective survey question were too low. According to the Association of German Engineers (VDI), engineers in Germany can expect around €4,300 gross as entry-level salary (Ilina, Sieben, and Janczura, 2023). With increasing years of experience and depending on the highest level of education, the average salary commonly rises (Ilina, Sieben, and Janczura, 2023). Moreover, there exist significant differences in the salary depending on the industry or region that the engineer is employed in (Ilina, Sieben, and Janczura, 2023). Therefore, as expected, salaries for engineers can differ a lot. According to the Austrian online job portal *Karriere.at* a monthly gross salary in Austria can differ between €2,600 and €4,400 (Karriere.at, no date). Following the German career platform *Stepstone*, the average gross salary paid by companies to engineers employed in Germany ranges between €3,800 and €4,800 (Stepstone, no date).

Considering the whole range of gross salaries from the entry-level positions to senior levels, a monthly gross salary of an engineer in Austria is approximately €4,600 while in Germany it is on average around €5,500 and thus, lifted by several high cases (Kununu, 2024; Ilina, Sieben, and Janczura, 2023). Therefore, the online sources as well as the findings of the survey suggest that the chosen salary categories have been set too low. For a better understanding of the salary distribution, it could have been useful to add more salary categories.

Finally, also the highest level of education and the hierarchical level in the company have been queried in the survey. The distribution of levels of education in the sample is shown in table 2. With a total share of 90.84%, the majority of respondents hold a university degree. Moreover, nine participants (6.87%) reported that they hold a PhD or any higher level of education. Lastly, three survey takers (2.29%) had completed high school education as their highest educational qualification.

Table 2 Levels of Education

Education	Freq.	Percent	Cum.
High school diploma	3	2.29	2.29
University degree	119	90.84	93.13
PhD and higher	9	6.87	100.00
Total	131	100.00	

Also, for the hierarchical level, which is displayed in table 3, three respondents (2.29%) inserted that they were still in school or training when taking the survey. 26 participants (19.85%) in total were holding an entry-level position at their current employer. With a number of 81 (61.83%), the vast majority of respondents occupied an experienced position. Furthermore, 13 participants (9.92%) were in a team lead position and 6 (4.58%) were managers. The two other cases in the sample were a PhD student and a professional.

Table 3 Hierarchical Level

Hierarchy	Freq.	Percent	Cum.
In school or training	3	2.29	2.29
Entry-level	26	19.85	22.14
Experienced	81	61.83	83.97
Team lead	13	9.92	93.89
Manager	6	4.58	98.47
Other	2	1.53	100.00
Total	131	100.00	

The next chapter explains the analysis of the described dataset. The aim of this chapter is to give a detailed insight into the descriptive statistics of the data, to evaluate the goodness of fit of our model and finally to test the hypotheses. As mentioned in the beginning of this thesis, the multiple regression analysis is applied for testing the hypothesis and thus, to answer the research question.

8. Analysis

Following the description of the sociodemographic characteristics of the sample, a comprehensive analysis of the data is carried out with regard to the five hypotheses. The first step consists of describing the variables included in the regression analysis and their measurement scales. In the second step, the relations between the variables in the multiple regression model are explained. Lastly, the running of the multiple regression model on the statistical software *Stata* serves to test the hypotheses and to answer the overall research question.

8.1. Variables and Scales

To begin with, the first part of the survey consisted of three eligibility questions. They were of a nominal scale and ensured that survey takers were fulfilling the requirements. In the following step, the independent variables of the model were constructed. For this reason, the second part of the survey was concerned with the respondents' attitudes towards the organisational and job factors described. Similarly to the study of Boswell et al, the eligible survey takers were queried "to rate the importance of a variety of factors to their job-choice decision" (2003, p. 26). The queried factors represented the independent variables. The *Possibility to Work on Cutting-edge Technology (Technology)*, *Personal Development Opportunities in a Challenging Work Setting (Development)*, *Positive and Collaborative Team Climate (Team Climate)*, *Personal Autonomy and Responsibility (Autonomy)*, and *Personal Risk Tolerance (Risk Tolerance)* are the independent variables in H1-H5 respectively. The importance of each characteristic was assessed by a 7-point Likert scale ranging from strongly disagree (= 1) to strongly agree (= 7). The Likert scale is an ordinal scale, nevertheless, as common for rating scales it is treated as quasi-metric scale due to the numbering of the agreement levels from one to seven (Braunecker, 2023, pp. 22, 103). For the first four independent variables, respondents indicated how much they agreed with each statement that the corresponding factor was important to them. For the fifth independent variable, participants were asked to state the extent to which they agree with the statement that they are willing to accept a higher level of risk in terms of job and income security in order to work on an innovative project. It results in all five independent variables having an ordinal or rather quasi-metric scale and being constructed by one item. Nevertheless, the second part of the survey contained eight questions in total. The second hypothesis was addressed by two statements (questions 5 & 6) and the fifth by three questions (questions 9, 10

& 11). While the fifth question was focused on the importance of developing skills and competencies in a challenging work setting, the sixth question was concerned with the importance of clear career advancement opportunities. The ninth and tenth questions were querying the importance of job and income security respectively. Finally, the tenth statement, as can be seen above, measured the acceptance of risk in terms of job and income security. Therefore, the fifth question measured the second independent variable (*Personal Development Opportunities in a Challenging Work Setting*), and the fifth independent variable (*Personal Risk Tolerance*) was constructed by the eleventh question. The other three questions had not been included to measure the two concepts but to improve clarity for participants.

The third part of the survey consisted of a vignette experiment measuring the *Dependent Variable*. The *Dependent Variable* in the research model is *the Preferred Choice of a Start-up as Employer over a Corporation* in regard to start-ups and corporations. For this reason, respondents were presented with two vignettes displaying an exemplary job advertisement for engineers of each a start-up and a corporation respectively. Afterwards, participants were asked to compare the attractiveness of the job advertisements of the two fictional companies towards each organisational and job factor. For each statement, the respondents had again to rate on a 7-point Likert scale their extent of agreement with it. All statements have been constructed similarly as follows: “In regard to [independent variable], the job advertisement of *Firm A* appeals to me more than the job advertisement of *Firm B*”. The disagreement with a statement implied the favouring of the job advertisement of the fictional corporation with regard to the mentioned factor. The agreement with it, represented the preference for the start-up. Such as the second, also the third part of the survey included eight questions about the depicted factors. Nevertheless, this time the questions were focussed on the effect of them on the *Dependent Variable*. The last question was querying the overall preference of the participants towards the two fictional companies based on the provided job advertisements. Participants could choose from four answer categories, namely: *Firm A* is more attractive; *Firm B* is more attractive; neither company seems to be an attractive employer; both are equally attractive employers. Moreover, in between the third part entailed the attention question as explained further above.

To construct the *Dependent Variable* the average of five items was used. These were the questions following the vignette experiment, which contained the first four independent variables (questions 12, 13, 16 and 17) as well as the question 20 about the overall preference for *Firm A* or *Firm B*. The items were combined and the mean of them measured the construct of *the Preferred Choice of a Start-up as Employer over a Corporation (Dependent Variable)*.

In order to combine them to the *Dependent Variable*, the four rating scale items (Likert scale) had to be standardised. Then the categorical variable indicating the preference for the companies was transformed into a binary variable labelling the preference for *Firm A* (fictional start-up) with the value 1 and assigning the value 2 to either the preference for *Firm B* (fictional corporation) or the indifference towards the companies (categories 3 and 4). In the next step, two dummy variables were constructed out of the binary preference and only the first dummy variable summarising the preference for *Firm A* has been included in the average of the *Dependent Variable* (Stoetzer, 2017, p. 62). Consequently, the *Dependent Variable* is a construct of five items measuring the preference for a start-up. The internal consistency of the five items was measured by the Cronbach's alpha, which is the most frequently used measure of reliability, as illustrated in table 4 (Moosbrugger and Kelava, 2020, p. 314).

Table 4 Cronbach's Alpha of the Dependent Variable

Test scale = mean(standardized items)	
Average interitem covariance:	.2689142
Number of items in the scale:	5
Scale reliability coefficient:	0.7003

Although no clear threshold is agreed upon, a scale reliability coefficient (Cronbach's alpha) of 0.70 and above is commonly understood as acceptable (Taber, 2018, p. 1278). The five items forming the *Dependent Variable* are assumed to measure the same underlying construct, namely *the Preferred Choice of a Start-up as Employer over a Corporation* (Moosbrugger and Kelava, 2020, p. 317). The Cronbach's alpha of 0.70 suggests that the items have "the same pattern of responses" (Taber, 2018, p. 1287). Therefore, the constructed *Dependent Variable* presents acceptable reliability.

Lastly, based on the literature review also several control variables that were expected to influence the choice of employer were included in the regression model. Firstly, the sociodemographic item *Age* has been included as control variable. Although also *Parenthood* and *Gender* had been planned to be included in the regression, the improvement of the F-value and the adjusted R-squared, which will be assessed further below, suggested an exclusion of them. Moreover, they are not central to the research purpose and thus, it had been decided to reduce the overall model for the sake of simplicity. The age of the participants was assessed by a ratio scale, i.e. respondents could enter their age in years as a number. Moreover, to include the ordinal scale items *Highest Level of Education* and *Gross Salary* as control variables, dummy variables have been created for each of their different categories (Stoetzer, 2017, p. 62).

In this way the ordinal scaled items were treated in the regression analysis as nominal items (Stoetzer, 2017, p. 68). To avoid perfect multicollinearity, their last category, namely “other” and “I do not wish to answer” respectively, had been excluded in the regression and thus, they served as reference categories (Stoetzer, 2017, p. 66). Furthermore, the question 15 was concerned with the *Clarity of the Offered Career Advancement Opportunities (Clarity Career)* which had been included as control variable. Lastly, the questions 18 and 19 assessed the items *Preference* towards *Firm A* or *Firm B* in regard of job and income security respectively and they were combined to one. Their mean formed the item *Risk Preference*. The scale reliability coefficient of 77.73% (Cronbach’s alpha) suggests reliable internal consistency of the two items forming the construct *Risk Preference*. To improve simplicity of the regression model, the other sociodemographic items *Nationality*, *Field of Engineering*, and *Hierarchical Level in the Company* have been excluded from the regression analysis together with *Parenthood* and *Gender*.

8.2. Descriptive Statistics

The following table 5 illustrates the descriptive measures of the independent variables. For a more detailed insight, the distribution of each item is included in the Appendix B tables 11 – 20. The first, third, and fifth independent variables *Technology*, *Team Climate*, and *Risk Tolerance* span from 1 (“strongly disagree”) to 7 (“strongly agree”) and thus, have also a higher standard deviation from the mean. Whereas the second and fourth independent variables *Development* and *Autonomy* range from 2 (“disagree”) to 7 (“strongly agree”).

Table 5 Descriptive Statistics of the Independent Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Technology	131	5.366	1.254	1	7
Development	131	6.084	.895	2	7
Team Climate	131	6.412	1.073	1	7
Autonomy	131	5.977	.956	2	7
Risk Tolerance	131	4.282	1.688	1	7

The mean of 5.366 suggests that the majority of engineers tend to find it important to work with cutting-edge technology. Furthermore, the median of the factor *Working with Cutting-edge Technology (Technology)* is 6, giving less weight to the eleven respondents that disagreed with its importance. The standard deviation of 1.254 from the mean and the skewness of -1.164 underline again that most of the values, namely around 79%, are on the right side of the distribution with a long tail towards the left.

Even more the mean of 6.084 implies that *Personal Development in a Challenging Work Setting (Development)* is perceived as important by engineers. The median of 6 is confirming this again. Furthermore, a standard deviation of 0.895 and a skewness of -1.652 stress the existence of a significantly strong left-skewed distribution. Only two respondents disagreed with its importance and another three were indifferent. Therefore, close to 96% of the participants found it important with approximately 33% even strongly agreeing with it.

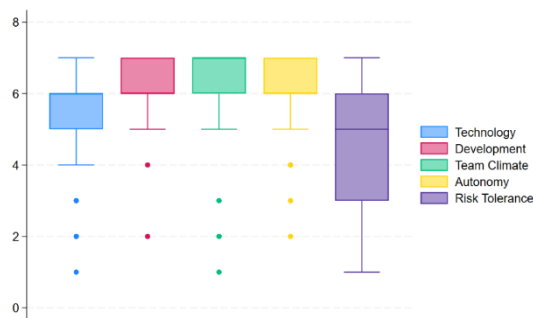
The highest mean of the independent variables has the item measuring the importance of a *Positive and Collaborative Team Climate (Team Climate)* with 6.412. The median of 7 highlights again its importance to engineers. The standard deviation is 1.073 and it is very strongly left-skewed with a skewness of -2.676. While there is a long left tail with five respondents disagreeing with its importance, around 65% of the participants strongly agreed with it. It is furthermore the only one of the five factors that had not been answered with indifference by any respondent. Therefore, it was answered by the strong majority of respondents, namely also around 96%, with a high value and suggests that it is deemed by engineers as a highly important factor when choosing an employer.

Moreover, also *Receiving Responsibility and Autonomy (Autonomy)* has been deemed as important as signified by the mean of 5.977 and the similar median of 6. The standard deviation of 0.956 and the skewness of -1.278 show again that the distribution is left-skewed with a majority of the data points being spread around the mean, i.e. having high values.

Lastly, the factor *Personal Risk Tolerance when Working with Cutting-edge Technology (Risk Tolerance)* has with the value 4.282 the smallest mean among the five factors. Together with the median of 5, it indicates that there exists a tendency among engineers to prioritise working on innovative projects, even if it means accepting higher risks to job and income security. The standard deviation is with 1.688 high and indicates a strong variability from the mean. Its skewness of -0.247 implies that the distribution is only slightly skewed to the left. Whereas half of the respondents, namely 66, agreed with it, 44 disagreed. Another 21 respondents (16%) felt indifferent towards this factor. While the factors *Development* and *Autonomy* have been answered only by three and seven respondents respectively with indifference, the factors *Technology* and *Risk Tolerance* were answered indifferently by 16 and 21 participating engineers respectively.

The following boxplot (fig. 3) illustrates the distribution of the data. While half of the data points of the first four items range between two values, the item *Risk Tolerance* has half of its data points spread among four scale points. Consequently, attitudes of the respondents towards risk acceptance differ significantly. The median of each variable is depicted by the slightly thicker lines at the lower or upper end of the boxes. Moreover, there exist outliers and extreme values for the first four independent variables as signified by the points in the boxplot (Braunecker, 2023, p. 63). Since these outliers provide important insights into the attitudes and the rather complex decision-making of the queried engineers, they have not been removed from the dataset (Backhaus et al, 2023, p. 54).

Figure 3 Boxplot of the Independent Variables



As mentioned further above, the items are measured on an ordinal scale with quasi-metric properties. Since outliers and extreme values remained in the analysed data, it is recommended to run the Spearman's correlation analysis rather than the Pearson's (Braunecker, 2023, p. 76). This is because the Spearman's rank coefficients give less weight to outliers (p. 76). When assessing the Spearman's rank coefficients, there exist no moderate, high, or very high correlations between the independent variables as illustrated in table 6.

Table 6 Spearman's Rank Coefficients for the Independent Variables

Variables	(1)	(2)	(3)	(4)	(5)
(1) Technology	1.000				
(2) Development	0.391	1.000			
(3) Team Climate	0.111	0.131	1.000		
(4) Autonomy	0.310	0.359	0.136	1.000	
(5) Risk Tolerance	0.406	0.319	-0.176	0.188	1.000

Nevertheless, the items *Technology* and *Development* have a low positive correlation, $r_s = 0.391$, which is statistically significant on a significance level of 0.01. On the same significance level, the variable *Technology* reports a low positive correlation with *Autonomy*, $r_s = 0.310$, and *Risk Tolerance*, with a rank coefficient of $r_s = 0.406$. Besides, *Development* and *Autonomy* are

lowly correlated ($r_s = 0.359$) as well as *Development* and *Risk Tolerance* ($r_s = 0.319$) on a significance level of 0.01. Therefore, it implies as the value of the item *Technology* and thus the importance of it increases, the higher are the importance of the factors *Development*, *Autonomy*, and *Risk Tolerance*. Moreover, the higher the importance of *Development*, also the more important the factors *Autonomy* and *Risk Tolerance* are for engineers and vice versa. Thus, there exists a slight tendency of respondents to allocate high values to the items *Autonomy* and *Risk Tolerance* when they answered also *Technology* and *Development* with higher values. Lastly, there exists a very low negative correlation between the items *Team Climate* and *Risk Tolerance* on a significance level of 0.05, with $r_s = -0.176$ and $p = 0.044$. Furthermore, *Autonomy* and *Risk Tolerance* report a very low positive correlation ($r_s = 0.188$) on a significance level of 0.05. Therefore, the more important the *Team Climate* is for an engineer, the less inclined he/she is to accept a higher level of risk. Lastly, the more important *Autonomy* is for engineers, the more willing they are to accept higher risk.

Since the *Dependent Variable* is formed out of five items, the descriptive statistics of the *Dependent Variable* itself as well as the five items forming it are illustrated in table 7. It has a mean of 0.066 and a standard deviation of 0.62 which derive from the average of the mean of the dummy variable *Preference for Firm A* and the standardised items which typically have a mean of 0 and a standard deviation of 1 (Backhaus et al, 2023, p. 76). Moreover, the *Dependent Variable* ranges between the values -1.33 and 1.4, illustrating the deviation from the standardised mean 0. More detailed statistics of the original items forming the *Dependent Variable* can be found in the Appendix B tables 21 – 32.

Table 7 Descriptive Statistics of the Dependent Variable

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable	131	.066	.62	-1.33	1.4
Pref_Technology_z	131	0	1	-2.231	1.241
Pref_Development_z	131	0	1	-1.676	2.004
Pref_Team_Climate_z	131	0	1	-2.288	1.323
Pref_Autonomy_z	131	0	1	-2.261	1.434
Preference_Firm A	131	.328	.471	0	1

The original items of the standardised variables were all ranging from the data points 1 to 7. The item *Preference Technology* has a mean of 4.855 and a standard deviation of 1.728. Therefore, the values deviate relatively strong from the mean. Moreover, the median is 6 and thus, higher than the mean indicating a left-skewness. This is underlined by the skewness value of -0.592. Consequently, more data points lay on the right side of the mean, and it exists a

tendency to prefer the job advertisement of *Firm A* in terms of working with cutting-edge technology. In total, around 63% of the respondents preferred job advertisement of *Firm A* and 14 participants (10.69%) were indifferent. Whereas two (1.53%) respondents chose to “strongly disagree”, 18 participants (13.74%) chose to “strongly agree” with the statement that *Firm A*’s job advertisement is more attractive in regard to cutting-edge technology. With 50 data points (38.17%), the majority answered with the scale item 6 (“agree”).

This was not the case for the variable *Preference Development*, which has most of its data points, namely 38 (29.01%), on the scale item 2 (“disagree”). Therefore, also the mean and median are significantly lower with 3.733 and 4 respectively. The standard deviation is 1.631 and the skewness 0.200 indicating a slight right-skew with more values on the left side of the mean. In total, 47 participants (35.88%) preferred job advertisement of *Firm A* over the one of *Firm B* in regard to development opportunities. Nevertheless, 62 respondents (47.33%) preferred *Firm B*’s and another 22 (16.79%) felt indifferent towards it.

Regarding the described team climate, respondents tended to prefer the job advertisement of *Firm A*, signified by a mean of 4.802 and a median of 5. The standard deviation is 1.661 and the skewness -0.531 indicating a moderate left-skewness. Out of 131 respondents, 23 (17.56%) somewhat agreed, 42 (32.06%) agreed, and 17 (12.98%) strongly agreed with *Firm A* being more attractive in terms of the described team climate. In comparison, only two respondents (1.53%) strongly disagreed, 17 (12.98%) disagreed, and 13 (9.92%) somewhat disagreed with it. Another 17 participants (12.98%) chose indifference for the item *Preference Team Climate*.

Lastly, the original item *Preference Autonomy* has a mean of 4.672 and a standard deviation of 1.624. The median is 5 and the skewness value is -0.510 indicating again a moderate skewness to the left. As for the first item (*Preference Technology*), also 50 respondents (38.17%) chose the scale item 6 (“agree”). Another nine respondents (6.87%) strongly agreed and 17 (12.98%) somewhat agreed. Therefore, in total 76 of the participants (58.02%) preferred job advertisement of *Firm A* in regard to the presented autonomy and responsibility. Besides, in terms of receiving autonomy and responsibility, 21 respondents (16.03%) felt indifferent and 34 (25.95%) preferred the job advertisement of *Firm B*.

Finally, the dummy variable *Preference for Firm A* has a mean of 0.328 and a standard deviation of 0.471. The mean symbolizes that around 33% of the respondents have preferred the job advertisement of *Firm A*. When looking at the distribution of the original item in table 8, it can be seen that 43 participants (32.82%) choose indeed the preference for *Firm A*. Nevertheless,

the majority of the queried engineers, namely 56 (42.75%), preferred *Firm B* over *Firm A*. Eight respondents (6.11%) answered that neither *Firm A* nor *Firm B* appeared attractive to them and 24 (18.32%) found both equally attractive employers. In total that results in 88 (67.18%) of the queried engineers feeling indifferent towards the two companies or preferring *Firm B*. These 88 data points make up the second dummy variable created out of the binary variable which is serving as reference category in the regression analysis (cf. Appendix B table 33).

Table 8 Attractiveness of Firm A vs. Firm B as Employers

Preference	Freq.	Percent	Cum.
1	43	32.82	32.82
2	56	42.75	75.57
3	8	6.11	81.68
4	24	18.32	100.00
Total	131	100.00	

Whereas none of the independent variables is correlated to the *Dependent Variable* on the significance level 0.01, the item *Development* has a significant but weak positive correlation with it on a significance level of 0.05, with $r_s = 0.181$ and $p = 0.039$. Thus, the more important *Personal Development in a Challenging Work Setting* is for an engineer, the more likely he/she is to prefer *Firm A* as employer. Detailed statistics are provided in the Appendix B table 34.

While the distribution of the sociodemographic items *Age*, *Highest Level of Education*, and *Gross Salary* have already been discussed (cf. Chapter 7.3.), the descriptive statistics of the other two control variables *Clarity Career* and *Risk Preference* are shown in table 9.

Table 9 Descriptive Statistics of Clarity Career and Risk Preference

Variable	Obs	Mean	Std. Dev.	Min	Max
Clarity Career	131	3.282	1.51	1	7
Risk Preference	131	2.912	1.42	1	7

The mean of the item *Clarity Career* is 3.282 and its median is 3. Together with a skewness of 0.710 this indicates a moderate skewness to the right with the bulk of data points being on the left side of the mean. Moreover, the standard deviation from the mean is 1.51. In total, with 81 respondents (61.83%) the vast majority preferred the job advertisement of *Firm B* in regard to the clarity of career advancement opportunities. In comparison, only 27 participants (20.61%) preferred *Firm A*'s job advertisement in this regard. Another 23 of the queried engineers (17.56%) felt indifferent towards this question.

Furthermore, the combined item *Risk Preference* has a mean of 2.912 and a standard deviation of 1.42. The skewness is 0.767 and indicates also a moderate skewness to the right. The median is 2.5 and is a half-point value due to the averaging of the two items *Preference Job Security* and *Preference Income Security*. In total 96 respondents (73.28%) preferred *Firm B* over *Firm A* in regard to the perceived risk posed on these items when in an employment with one of the two fictional firms. Only 26 participants (19.85%) preferred *Firm A* and nine (6.87%) felt indifferent towards the question. Also here, the detailed statistics are provided in the Appendix B tables 35 – 43.

On the significance level 0.01, the factor *Career Clarity* has a positive low to moderate correlation with the *Dependent Variable*, with $r_s = 0.465$ and with *Risk Preference*, with $r_s = 0.482$. That means that the clearer engineers perceive the described career opportunities, the more they tend to accept the higher risk in regard to job and income security at *Firm A*. Moreover, the more clarity is given in regard to advancement opportunities, the more likely engineers are also to prefer *Firm A* as employer. Furthermore, the item *Risk Preference* and the *Dependent Variable* are slightly correlated on a significance level 0.01 with a rank correlation coefficient of $r_s = 0.279$. Consequently, the more an engineer prefers *Firm A* in terms of the perceived risk, the more likely engineers are to prefer *Firm A* as employer overall. Also, the independent variable *Risk Tolerance* and the control variable *Risk Preference* have a low positive correlation with a rank correlation coefficient of $r_s = 0.286$. This implies that the more engineers tend to accept higher risk levels when working with cutting-edge technology, the more they also prefer *Firm A* in regard to the posed risk towards income and job security. Moreover, the independent variable *Autonomy* and the control variable *Salary Level 4* (€5,000 or more) are positively correlated with a low rank correlation coefficient of $r_s = 0.271$. Thus, the higher the income level, the more important becomes autonomy in the job role for engineers. Besides, it is to say that the dummy variables from the same categories have typically high correlation values with each other. Nevertheless, this will not be further analysed since it derives from their nature.

Moreover, the *Dependent Variable* and the control variable *Salary Level 2* (€3,000 up to €3,999) are very lowly correlated with $r_s = 0.198$ and a significance level of 0.05. Thus, respondents earning on the second salary level are slightly more likely to prefer *Firm A*. Moreover, on the same significance level the independent variable *Technology* and *Risk Preference* have a very low positive correlation with rank correlation coefficient of $r_s = 0.176$. The independent variable *Development* has a very low negative correlation with two control

variables on the significance level 0.05. Namely with *Age* ($r_s = -0.206$) and *Salary Level 3* (€4,000 up to €4,999) with $r_s = -0.190$. Furthermore, it is very lowly positively correlated with the control variable *Salary Level 4* (€5,000 or more) on the significance level 0.05 and a rank correlation coefficient of $r_s = 0.198$. Thus, the more important is development for an engineer, the lower is the engineer's age and the lower is the possibility that the engineer earns on the third salary level and vice versa. Moreover, it suggests that when earning on the fourth salary level the more important becomes the development of skills and competencies for an engineer. Furthermore, the independent variable *Autonomy* is very lowly negatively correlated with the control variable *Salary Level 1* (less than €3,000). Their very low and negative rank correlation coefficient $r_s = -0.186$ indicates that the more important autonomy in the job role is for an engineer, the less likely it is that the engineers earn on a very low salary level. This resonates with the positive correlation of *Autonomy* and *Salary Level 4*, as described further above. With $r_s = 0.214$, the *Risk Tolerance* of engineers is slightly higher when earning on the *Salary Level 1* (less than €3,000). Moreover, on the same significance level the items *Age* and the *Salary Level 1* are slightly negatively correlated with $r_s = -0.173$. This suggests that the older engineers are, the less likely it is that they earn a salary of less than €3,000. The detailed statistics are provided in the Appendix B table 44.

8.3. Multiple Regression Analysis

Following the explanation of the sociodemographic characteristics of the sample and the descriptive statistics of the variables, the multiple regression analysis of the model will be outlined. A multiple regression analysis was deemed as necessary methodology in order to explain the combined influence of several factors on the *Dependent Variable* (Stoetzer, 2017, p. 50). The multiple regression analysis will therefore test the hypotheses in order to answer our overall research question. The collected survey data was processed and evaluated using the statistics programme *Stata*. The regression output is depicted in table 10 on the subsequent page.

Table 10 Multiple Regression Analysis of the Model**Linear regression**

Dependent_Variable	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Technology	-.084	.046	-1.83	.069	-.174	.007	*
Development	.18	.067	2.68	.008	.047	.312	***
Team_Climate	-.036	.052	-0.69	.495	-.139	.067	
Autonomy	.077	.06	1.27	.206	-.043	.196	
Risk_Tolerance	-.03	.035	-0.85	.398	-.099	.04	
Age	.013	.009	1.39	.167	-.006	.032	
High_School	.218	.395	0.55	.582	-.564	1.001	
University_Degree	.344	.188	1.82	.071	-.029	.717	*
Salary_Level_1	.114	.313	0.37	.716	-.506	.735	
Salary_Level_2	.541	.241	2.24	.027	.063	1.018	**
Salary_Level_3	.235	.202	1.16	.248	-.165	.635	
Salary_Level_4	.222	.198	1.12	.263	-.169	.614	
Clarity_Career	.203	.035	5.72	0	.132	.273	***
Risk_Preference	.032	.039	0.81	.422	-.046	.109	
Constant	-2.406	.627	-3.83	0	-3.649	-1.163	***
Mean dependent var		0.066	SD dependent var			0.620	
R-squared		0.380	Number of obs			131	
F-test		5.075	Prob > F			0.000	
Akaike crit. (AIC)		212.791	Bayesian crit. (BIC)			255.919	

*** $p < .01$, ** $p < .05$, * $p < .1$ **8.3.1. Assumptions of Linear Regression**

Prior to the statistical analysis of the model, it will be tested against the assumptions of multiple regression analysis. To begin with, the assumption of linearity is tested. For this, the residuals are plotted “against each [...] independent variable and the estimated outcome variable” (Katz, 2006, p. 138). For the independent variable *Technology*, the values are not perfectly equally spread “above and below zero” (Katz, 2006, p. 138). Moreover, some points in the scatterplot are rather far from zero and not symmetrical spread along the zero line and thus, indicating outliers. Moreover, in the plot a slight curve shape can be detected. Also, the scatterplot for the independent variable *Development* shows two potential outliers. This was already described in the boxplot (cf. fig. 3) in Chapter 8.2. Apart from these two points, the other points are spread somewhat equally along zero. Besides, the scatterplots for the variables *Team Climate* and *Autonomy* illustrate deviations from linearity. Their data points are not perfectly spread along the zero line. Lastly, the scatterplot of the independent variable *Risk Tolerance* shows a somewhat equal spread around zero of the data points and no potential outliers.

To get a better understanding of the existence of a linear relationship for each independent variable with the *Dependent Variable*, five Component-Plus-Residual (CPR) plots, or also called Partial Residual plots, were created in the next step (Larsen and McCleary, 1972, p. 781; Mallows, 1986, p. 313; Universität Zürich, no date). The five plots can be found in the Appendix B figures 4 – 8. The plots “give a pictorial representation of each variable’s effect on [the Dependent Variable]” (Larsen and McCleary, 1972, p. 786). First, the CPR plot for the variable

Technology shows a non-perfect negative linear trend. On the contrary, the independent variable *Development* has a positive but not perfectly linear effect on the *Dependent Variable*. The CPR plot for *Team Climate* illustrates a slightly negative and not perfect linearity. The independent variable *Autonomy* has a non-perfect and positive effect on the *Dependent Variable*. Lastly, the CPR plot of *Risk Tolerance* and the component plus residual depicts a slightly negative and somewhat perfect linear line. Because real world relations are not linear but simplified by linear models, the not perfectly linear effects of the independent variables on the *Dependent Variable* can be accepted (Backhaus et al, 2023, p. 104). Furthermore, as explained before, outliers and extreme values have been kept in the dataset because they provide important information about the preferences and complex decision-makings of engineers. These points are potentially harming perfect linearity. Nevertheless, the graphical analysis might not be fully interpretable in relation to linearity (Stoetzer, 2017, p. 184). Therefore, the RESET-test (regression specification error test) was conducted in the following (Stoetzer, 2017, p. 184). The RESET-test is carried out with the whole regression model and the underlying null hypothesis is that no non-linearities are present (Stoetzer, 2017, p. 184). The results of the test show a F-value of 0.89 and a p-value for the F-test of 0.4490. This means that the null hypothesis cannot be rejected on a 0.05 significance level and thus, no violations of the linearity assumption are apparent.

In the following step, the Breusch-Pagan test (or Cook-Weisberg test) is performed to test the regression model for the homoscedasticity assumption. If the null hypothesis has to be rejected, then heteroskedasticity is apparent. Heteroskedasticity describes the state when the residuals are depending on the values of the independent variables and consequently, they are forming a specific muster or structure (Stoetzer, 2017, p. 135). Heteroskedasticity can be detected by plotting the residuals against the estimated values of the dependent variable and independent variables (Stoetzer, 2017, p. 137). This can be seen in the Appendix B figure 9. Following the visualisation a slight pattern in form of a subtle curve is apparent. However, the statistical Breusch-Pagan test gives clearer interpretable results (Stoetzer, 2017, p. 137). The test provides a chi-square of 0.17 and a p-value of 0.680. On a significance level of 0.05, the null hypothesis of homoscedasticity cannot be rejected since the p-value is significantly higher than 0.05. Also, the White's test for detecting heteroskedasticity yields the same result. With a chi-square of 87.68 and a p-value of 0.459, the null hypothesis cannot be rejected, and homoscedasticity can be assumed (Stoetzer, 2017, p. 138). Consequently, the subtle pattern is not resulting in an issue with heteroskedasticity. Because heteroskedasticity can also signal model misspecifications,

such as non-linearity, the absence of heteroskedasticity supports the acceptance of linearity (Stoetzer, 2017, p. 140).

Besides, autocorrelation has not to be tested, since the conducted data is cross-sectional (Stoetzer, 2017, p. 147). Nevertheless, the assumption of normal distribution of the residuals will be assessed in this paragraph. For testing the normal distribution of the residuals, the visual assessment as well as the Shapiro-Wilk test and the Kolmogorov-Smirnov test are useful (Stoetzer, 2017, p. 154). Nevertheless, the Shapiro-Wilk test is most commonly used and is more reliable than the Kolmogorov-Smirnov test (Stoetzer, 2017, p. 158). Therefore, both the Q-Q plot and the statistical Shapiro-Wilk test will be assessed. Following the Q-Q plot of the standardised residuals, not all points are on the line but relatively close to it (cf. Appendix B figure 10). Thus, the normal distribution of the residuals can be assumed. The Shapiro-Wilk test yields a $z = 1.786$ with a p-value of 0.037 and thus, supports this finding. On a significance level of 0.05, the null hypothesis of normal distribution has to be rejected. Nevertheless, the W-value of 0.979 suggests that the residuals are close to normally distributed. This goes hand in hand with the analysis of the Q-Q plot. It is to say that the non-existence of the residuals' normal distribution is generally ignored in economic research (Stoetzer, 2017, p. 155). This is because it is expected that with a rising number of observations (asymptotical) the residuals will get closer to a normal distribution (Stoetzer, 2017, p. 155). Consequently, the non-perfect normal distribution is recognised and not deemed as important for the analysis.

Finally, the depicted multiple regression model is reviewed for multicollinearity. Multicollinearity exists when one or more of the independent and control variables are highly correlated with each other (Stoetzer, 2017, p. 159). Following the Pearson's rank correlation, none of the variables were highly correlated. The assessment of the Variance Inflation Factor (VIF) confirms this. The mean VIF of all the independent and control variables included in the multiple regression model is 2.011 as illustrated in the Appendix B table 45. The highest values derive from the dummy variables, since the dummy variables of the same categories are correlated with each other. Nevertheless, all VIF values and the mean VIF are beneath the threshold of 5 and thus, do not show any indication of problems with multicollinearity (Stoetzer, 2017, p. 163).

As the last step, the focus is again on outliers and whether there are observations that influence the regression hyperplane. Following the observation of the standardised residuals, there are no residuals that have a standard deviation above the threshold 3 (Stoetzer, 2017, p. 172). Nevertheless, the minimum value is -2.646 and the maximum value is 2.388 and thus, above

the stricter threshold of 2 (Stoetzer, 2017, p. 172). Looking closer at the standardised residuals of the individual responses, it can be noted that three respondents are deviating with their answers from the predicted values in the regression model. The answer lines 76, 118, and 121 have a standardised residual with a standard deviation above 2. However, when examining the response rows closer, no significant values in variables that cannot be explained by complex decision-making can be detected. Therefore, it is assumed that no errors have been the causality for the outliers. In the next step, it has to be examined whether these outliers are influential observations for the depicted regression model. Firstly, it has to be noted that their impact is the more influential the smaller the sample (Stoetzer, 2017, p. 172). With 131 observations the sample size is not small. Nevertheless, to identify the influential observations, several statistical options are given (Stoetzer, 2017, p. 174).

To understand the impact of the three observations on a regression coefficient and on the whole regression model, the DFBETA and the Cook's Distance (Cook's D) are determined respectively (Stoetzer, 2017, p. 174). None of the variables has a DFBETA value above 1 and thus, can be regarded as not highly influential on the regression coefficients (Stoetzer, 2017, p. 174). For the 76th observation, the variables *Technology*, *Team Climate*, and *Clarity Career* have a DFBETA value of above 0.5 or below -0.5. Therefore, the 76th observation has a moderate influence on the regression coefficients of these variables. On the contrary, the 118th observation has no DFBETA values above 0.5 or below -0.5. Consequently, this observation does not influence any regression coefficient in a considerable manner. Lastly, the 121st observation has a DFBETA value below -0.5 for the variable *University Degree* and thus, is moderately influencing its regression coefficient. To sum it up, no variable has a DFBETA value above the absolute value 1. It results that none of the observations are impacting any regression coefficient in a problematic manner (Stoetzer, 2017, p. 175). Also, for the Cook's D, none of the observations are influential on the regression coefficients of the whole model above the critical threshold value of 1 (Stoetzer, 2017, p. 175). Nevertheless, when taking the more cautious threshold of $4/N$, which is approximately 0.031, six observations are considered as influential (Stoetzer, 2017, p. 175). Namely, the three observations recognised before (76th, 118th, 121st) as well as 57th, the 78th and the 98th. Since these observations are important to understand complex decision-making, the results with the first threshold for the Cook's D have been accepted and the more influential observations have not been removed from the dataset.

After testing the model for the assumptions of linear regression, the model's explanatory power will be discussed in the next section based on several statistical measures.

8.3.2. Explanatory Power of the Depicted Regression Model

With 30.959, the statistical measure Sum of Squared Residuals (SSR) of the chosen model has been among the smallest compared to models including less control variables. Moreover, it is significantly smaller compared to the simplified model that did not include any control variables and had a SSR of 47.702. Consequently, the chosen model has the best adaptation to the data when compared to the other models (Backhaus et al, 2023, p. 87). Nevertheless, due to the different scales of the variables, the absolute size of the SSR itself cannot give an indication of the goodness of fit of the model (Stoetzer, 2017, p. 43). To test the goodness of fit of the model, the coefficient of determination (R^2 or R-squared) and the F-test with its corresponding p-value are assessed.

To assess how well our model can explain the changes in our *Dependent Variable* the coefficient of determination is examined. The R-squared serves as a common measure of the *goodness of fit*, i.e. how well the estimated hyperplane is fitting the observations (Stoetzer, 2017, p. 40). Due to several independent variables, the regression model is illustrated by a hyperplane rather than a regression line (Stoetzer, 2017, p. 36). The model has a coefficient of determination of $R^2 = 0.380$. Thus, 38% of the variation in our *Dependent Variable* is explained by our model (Backhaus et al, 2023, p. 88). Although the R-squared is relatively low and thus, illustrates that a big part of the variability in our *Dependent Variable* cannot be explained by our model this does not necessarily mean that the results are not meaningfully interpretable (Stoetzer, 2017, p. 42). Whereas a higher R-squared is always indicating a better model fit, there exists no threshold for a good R-squared (Backhaus et al, 2023, pp. 88, 90). Whether an R-squared can be considered as good depends on the applied field and the type of data (Stoetzer, 2017, p. 90). In fields where human behaviour is involved such as economics, sociology, or psychology, the values of R-squared tend to be significantly lower than in fields such as engineering or physics (Stoetzer, 2017, p. 90). Moreover, in microeconomic research it is likely to receive values for R^2 below 0.3 (Stoetzer, 2017, p. 42). Nevertheless, the adjusted R^2 of the model is with 0.305 smaller than R-squared. This is because the adjusted R-squared considers the degrees of freedom, i.e. the difference between the number of observations and the included independent and control variables. If the added variables do not add accurate explanatory power, the adjusted R-squared is becoming smaller with more variables being added to the regression model (Stoetzer, 2017, p. 42). Since five independent variables and nine control variables have been included in the regression analysis the R-squared is higher than the adjusted R-squared. When comparing the value of the adjusted R-squared of the depicted model to other

tested models with less or more control variables, it is higher than them and thus suggests a better overall model fit.

Lastly, also the values of the AIC (Akaike's information criterion) and of the BIC (Schwarz's Bayesian information criterion), which are shown in the last line of the regression output, are also smaller in the depicted model compared to the others. On the contrary to the R-squared, the smaller values for both the AIC and BIC indicate a better fit of the regression model (Stoetzer, 2017, p. 219). As a consequence, although firstly planned to be included, the control variables *Parenthood* and *Gender* have been excluded from the regression model.

However, the values of R-squared and the adjusted R-squared do not determine the quality of the regression model and may also be a result "by coincidence" of the sample (Stoetzer, 2017, pp. 42-43). Thus, the probability that the estimated coefficients correspond to the real and unknown coefficients has to be tested (Stoetzer, 2017, p. 43). Therefore, the F-value resulting from the F-test will be discussed in the next step. The F-test tests the overall significance of the model. Thus, it is tested whether the depicted model has explanatory value or that the independent variables have no influence on the dependent variable (null hypothesis). The F-value is based on the ratio of what can be explained by the chosen regression model and what cannot be explained and thus a higher F-value is preferred (Stoetzer, 2017, p. 44). The F-value of the reduced model with the *Parenthood* and *Gender* excluded as control variables is higher than the F-value with them included. As a result, the chosen model has a F-value of 5.075 on a significance level of <0.01 and even <0.001 and thus, is highly significant. This means that our null hypothesis that none of the independent variables have an influence on our dependent variable can be rejected on a significance level of 0.001 (Stoetzer, 2017, p. 45).

After testing the overall explanatory value of our regression model on the changes in the *Dependent Variable*, the regression coefficients are tested on their explanatory value with the t-test. The statistical software programme *Stata* provides the t-values with the corresponding p-values for each coefficient directly in the output of the regression table as illustrated in table 10. Moreover, significant coefficient values are marked by one or more asterisks. One asterisk, two asterisks, and three asterisks signify the significance on the levels of $p<0.10$, $p<0.05$, and $p<0.01$, respectively. A significant coefficient value means that the influence of the variable on the *Dependent Variable* in the population of engineers has explanatory value and is not resulting from coincidence in the sample (Stoetzer, 2017, p. 45). Like the F-test, the corresponding null hypothesis of the variable having no effect on the *Dependent Variable* in the population of engineers can be rejected depending on the t-value and p-value (Stoetzer, 2017, p. 45). A high

t-value with a corresponding low p-value of a coefficient signifies the influence of the variable on the *Dependent Variable* and results in the rejection of the null hypothesis. Next to the column of the p-value, also the 95% confidence intervals for our variables are given. The confidence interval conveys the ranges between which the true coefficient values lie with a probability of 95% (Stoetzer, 2017, p. 46).

Following the results of the t-test, the regression coefficient of the independent variable *Technology* has no or only marginal explanatory value on the *Dependent Variable* over the population of engineers. The t-value of *Technology* is -1.83 and the p-value is 0.069. The t-value is smaller than the absolute value $|t| > 2$ and thus, *Technology* has no statistical significance or at least no strong one (Stoetzer, 2017, p. 45). With $p < 0.1$, *Technology* has a negative regression coefficient $b_1 = -0.084$. Consequently, it implies a marginally negative influence of *Technology* on the *Dependent Variable*. Moreover, with a probability of 95% the true coefficient value lies between -0.174 and 0.007.

The independent variable *Development* has a t-value of 2.68 and the corresponding p-value is 0.008. The t-value being above the absolute value 2 and the p-value below the significance level 0.01 imply that the factor *Development* has a statistically significant influence on the *Dependent Variable*. Marked by *Stata* with three asterisks indicates a high statistical significance. Moreover, *Development* has a positive regression coefficient, $b_2 = 0.18$. Lastly, in a 95% confidence interval, the true coefficient value lies between 0.047 and 0.321.

Moreover, the independent variable *Team Climate* is not statistically significant with a very high p-value of 0.495. The t-value is with -0.69 rather small and thus, the factor has no statistically significant influence over the population of engineers. Further, *Team Climate* has a small coefficient, $b_3 = -0.036$, and with $p > 0.1$, the regression coefficient is not significant. Besides, the true value of the coefficient ranges between -0.139 and 0.067 in a 95% confidence interval.

This is also the case for the fourth independent variable, namely *Autonomy*. It has a $b_4 = 0.077$ but with a t-value of 1.27 and a p-value of 0.206, the coefficient has no statistical significance. With a probability of 95% the true coefficient value of the variable is ranging from -0.043 and 0.196. *Autonomy* has a $p = 0.206$ and consequently its coefficient is not statistically significant.

Lastly, also the independent variable *Risk Tolerance* from H5 has a $b_5 = -0.03$ and $p = 0.398 > 0.05$. The t-value is $< |2|$ and thus, the coefficient is not statistically significant. With a 95% confidence interval the true coefficient value lies between -0.099 and 0.04. Therefore, *Risk*

Tolerance has with a t-value of -0.85 and p-value of 0.398 no statistically significant impact on the *Dependent Variable*.

Moreover, certain control variables have a statistically significant influence on the *Dependent Variable*. Firstly, the dummy and control variable *University Degree* is marked by one asterisk and thus, significant on a significance level of 0.10. Its coefficient is with 0.344 relatively large compared to the others. However, the t-value is 1.82 and thus, smaller than two (Stoetzer, 2017, p. 45). Therefore, the coefficient is only with a low probability statistically significant (Stoetzer, 2017, p. 45). As is common also in this study, a p-value > 0.05 is deeming a coefficient as not statistically significant. Thus, the *University Degree* has no statistically significant impact on the *Dependent Variable*. Secondly, the dummy and control variable *Salary Level 2* has the highest absolute coefficient value. With $b_{10} = 0.541$, $t = 2.24$, and $p = 0.027$, a statistical significance of it on a 0.05 significance level can be accepted. Thirdly, the statistical significance of the control variable *Clarity Career* is indicated by three asterisks. The p-value is zero and the t-value is the highest for all coefficients with $t = 5.72$. The coefficient itself is 0.203 and ranges between 0.132 and 0.273 in a 95% confidence interval. Therefore, the coefficient of *Clarity Career* is highly statistically significant.

Lastly, also the constant is marked as highly statistically significant by three asterisks. It also has a $p = 0$ and the coefficient's t-value is -3.83 and thus significant on 0.01. The coefficient of the constant itself is -2.406. Thus, if no factors would be considered, there would be still a significant difference from zero observable in the *Dependent Variable*.

In this chapter the findings of the multiple regression analysis are first summarised and then discussed regarding the research question and the five hypotheses. The results will be interpreted within the framework of the *Employer Branding* theory and the literature review conducted in the fourth and fifth chapters. Following the summary and interpretation of the results, the limitations of the study will be reviewed.

9. Discussion

The overall research question leading the study is: “*Under which conditions would an engineer choose to work for a start-up rather than for a corporation?*”. In the pursuit of answering it, a thorough review of literature on *Employer Branding*, *P-O Fit*, and the recruitment of STEM talent has been conducted. The theoretical framework gained by it enabled the formulation of five hypotheses. The first four hypotheses suggest that the stating of the four following factors in a job advertisement increase the perceived attractiveness of start-ups as an employer: An innovative environment with the possibility to work on cutting-edge technology, development opportunities in a challenging work setting, a positive and collaborative team climate, and gaining autonomy and responsibility. The fifth hypothesis proposes that the greater the willingness of engineers to accept a higher level of risk in terms of job and income security in order to work on an innovative project, the more attractive start-ups are perceived to be as employer.

The dataset was created from the answers of an online questionnaire including a vignette study consisting of two fictional job advertisements. The multiple regression analysis was conducted to test the hypotheses. Following the stated order, the five hypotheses were assessed by five independent variables included in the regression model. The results will be summarised and then interpreted in the following two subchapters in the order of the proposed hypotheses.

9.1. Summary of the Results

Examining the first hypothesis, the independent variable *Technology* yields a negative coefficient, which is statistically not significant with $p = 0.069$. However, the second hypothesis with the corresponding independent variable *Development* is highly statistically significant with $p = 0.008 < 0.01$. The testing of the other three hypothesis with the independent variables *Team Climate*, *Autonomy*, and *Risk Tolerance* all provide statistically insignificant p-values. The p-values are with $p = 0.495$, $p = 0.206$, and $p = 0.398$ significantly higher than $p < 0.05$. Moreover, the control variables *Salary Level 2* and *Clarity Career* have statistically significant coefficients with $p = 0.027$ and $p = 0$.

9.2. Interpretation of the Results

Hypothesis 1 has to be rejected because of two reasons. First, contradicting the first hypothesis, an inverse relationship between *Technology* and the *Dependent Variable* is suggested by the negative regression coefficient $b_1 = -0.084$. Second, $p = 0.069$ points out that the coefficient is statistically insignificant. Therefore, the null hypothesis that *Technology* has no influence on the *Dependent Variable* cannot be rejected. This means that stating the possibility to work in an innovative environment on cutting-edge technology does not increase the perceived attractiveness of a start-up for German and Austrian engineers. This finding is contradicting several previous findings listed in the fifth chapter. Roach and Sauermann (2023, pp. 16, 21) as well as Gwynne (2012, p. 7) noted that the possibility of working on cutting-edge technology is an important factor for STEM students and graduates when choosing a start-up as an employer. However, both the studies were conducted in the United States and thus, cultural differences must be considered. The country comparison tool by Hofstede Insights (2024) illustrates in simple terms the cultural differences of various countries along six dimensions. When comparing the cultural dimensions of the United States to Germany and Austria, it is visible that Austria and Germany score significantly higher in the dimension *Uncertainty Avoidance* than the United States does (Hofstede Insights, 2024). Austria and Germany have a score of 70 and 65 respectively while the United States is scoring the relatively small digit 46 (Hofstede Insights, 2024). Since start-ups are facing significantly higher levels of risk compared to incumbent firms for the benefit of innovation (Audretsch, Belitski and Caiazza, 2021, p. 1998; Czarnitzki and Delanote, 2013, pp. 1316, 1319), this is likely to explain the hesitation of Austrian and German engineering professionals to work in an innovative environment on cutting-edge technology. Nevertheless, in the future further studies should be invested on cultural differences of engineers to receive better insights on their decision-making.

Moreover, the paper of Gwynne (2012) has been published twelve years ago and the study of Roach and Sauermann (2023, p. 8) was conducted between 2010 and 2016. Therefore, the findings nowadays can differ significantly. Furthermore, the research design in Roach and Sauermann (2023) applied two online questionnaires over a period of six years. In comparison, for this thesis the data collection was done for a duration of six weeks and the questionnaire included a short vignette study. Consequently, this thesis works with a dataset from one specific point of time while the dataset of Roach and Sauermann (2023) spans several years. Lastly, another reason for the different results may be that this thesis focused merely on engineers whereas the other studies were concentrated on STEM or science and engineering PhD students and graduates in general.

The second independent variable *Development* has a positive coefficient with $b_2 = 0.18$ and a $p < 0.01$. Therefore, the coefficient is highly significant which means that *the Preferred Choice of a Start-up as Employer over a Corporation* is influenced by stating the development opportunities in a job advertisement of start-ups. Thus, the null hypothesis has to be rejected on a significance level 0.01 and the second hypothesis can be accepted. This means that when engineers rate the importance of *Development* higher, i.e. choose one unit higher on a 7-point Likert-scale, the *Dependent Variable* increases in b_2 units, while all other factors are kept constant (Stoetzer, 2017, p. 78). This is consistent with the other studies that also find that stating development opportunities in job advertisements increases a start-up's attractiveness to STEM talent (Gwynne, 2012, p. 7; Gurtner, Kels, and Scherrer, 2017, p. 176; Tumasjan, Strobel, and Welp, 2011, p. 128; Wall Bortz et al, 2020, p. 946). Although the majority of studies were conducted in different countries than Austria and Germany, similar results have been assessed. The study of Wall Bortz et al (2020) was carried out in the United States and the research of Gurtner, Kels, and Scherrer (2017) was conducted in Switzerland. Only the study of Tumasjan, Strobel, and Welp (2011) has been carried out with STEM students and graduates from German universities. Furthermore, none of the studies has been focused on engineers but on STEM talent in general. Nevertheless, according to Tumasjan, Strobel, and Welp (2011, pp. 123, 128) the STEM talent sees in the nature of a start-up the opportunity of a strong learning curve. Therefore, it is likely that the stating of development opportunities in a challenging work setting in job advertisements of start-ups confirms the expectations of engineers towards start-ups and thus, influences positively the attractiveness of a start-up. The positive impact of development opportunities is visible in the results of previous studies and validated again in this thesis.

Consistent with the literature review, engineers expect to develop their competencies and skills in the challenging work setting of start-ups. This is especially the case for STEM talent in the beginning of their careers (Gwynne, 2012, p. 7). Considering the rather young age distribution in this thesis' dataset, it is likely to be also a major reason for the importance of personal development in this study. Moreover, it is interesting that the only highly statistically significant control variable is *Clarity Career*. As the factor *Development*, it is also positively impacting the *Dependent Variable* with $b_{13} = 0.203$ and $p = 0$. Consequently, the description of *Personal Development in a Challenging Work Setting* as well as stating clearly the existing career advancement opportunities in job advertisements increases an engineer's preference for start-ups. This is consistent with the results of Gurtner, Kels, and Scherrer (2017, p. 176) who identified career prospects as important job feature for STEM professionals. Lastly, the control

variable *Salary Level 2* is statistically significant with $p = 0.27$ and $b_{10} = 0.541$. This means that the engineers who are earning in the rather low salary category ranging from €3,000 to €3,999 are more likely to prefer the job advertisement of a start-up. Since these engineers are more likely to be in the beginning of their careers it can be expected that rather than the financial remuneration, other aspects such as personal development in an innovative and challenging work setting and career advancement are important to them (Gwynne, 2012, p. 7; Roach and Sauermann, 2023, p. 21).

Moreover, the third hypothesis has to be rejected due to the large p-value ($p = 0.495$) of the regression coefficient b_3 . The p-value is much greater in size than the significance level 0.05. This means that *Team Climate* has no statistically significant influence on the *Dependent Variable*. Although both the studies of Wall Bortz et al (2020) and of DeFraine, Williams, and Ceci (2014) found contradicting to this thesis that a collaborative and positive team climate is important to STEM program leaders, professors and students, several factors have to be acknowledged. First, as elaborated further above cultural differences can impact the results of the studies. Both previous studies have been carried out in the United States and not in Austria or Germany. Moreover, the type of respondents differs significantly. Whereas the thesis' sample consists mainly of engineers that are employed on the labour market, the other two studies were conducted at universities in the United States. Furthermore, although similar to this thesis the study of DeFraine, Williams, and Ceci (2014) is also working with two vignettes, it is focused on the specific work setting in laboratories. Finally, Wall Bortz et al (2020) combined the qualitative and quantitative research methodology in their study. All these factors as well as time differences may explain the differences in the results of this study compared to previous studies.

Furthermore, with $p > 0.10$ for b_4 also the fourth hypothesis has to be rejected. The null hypothesis that *Autonomy* has no influence on the *Dependent Variable* is therefore accepted. Again, this is contradicting the findings of previous studies. Several studies that were presented in the literature review in the fifth chapter confirmed the importance of receiving autonomy and responsibilities in a job role (Gurtner, Kels, and Scherrer, 2017, p. 176; Roach and Sauermann, 2023, p. 14; Tumasjan, Strobel, and Welp, 2011, pp. 123, 127-28). Nevertheless, none of the precedent research focused on the importance of different job factors in job advertisements.

Following the findings of Boswell et al (2003, p. 32) it has to be taken into consideration that different stages of the recruitment process bring forward different job-choice factors as important. While the four organisational and job factors have been deemed as important, the

testing of H1 – H4 found that for engineers only the factor *Development* is important to be stated in a job advertisement. Since job advertisements are in the very beginning of a recruiting process, possibly, the other three factors become more important throughout the later stages of the recruiting process. This is also underlined by the feedback that respondents were able to enter at the end of the survey. One of the participants wrote: “*For me it is not so important how a company presents itself in a job description. It is more important how they treat you during the application process. And maybe how employees rate the company.*” Besides, another participant describes that the experience of other employees (friends, acquaintances, reviews), the appearance in public (potential crises in the past, how do people speak about the company) and the first or rather the second impression of a company in the interview (do I even fit to the company’s culture) are the important factors for choosing an employer. While the thesis does not aim to provide the answer for the final choice of an employer, it aims to understand which factors are relevant for engineers when deeming a start-up as more attractive than a corporation in the initial phase of a recruitment process. A recruitment process is more complex and, in this thesis, only the initial stage of it has been tested with two fictional job advertisements. Consequently, for the first, third, and fourth hypotheses the different findings may be explained by the applied methodology, the differences in the samples, cultural differences, and the displayed stage of recruitment. In the next paragraph, the results of the fifth hypothesis are interpreted. The fifth hypothesis tested the impact of the personal risk tolerance of engineers.

The fifth coefficient yields a $p = 0.398$ for $b_5 = -0.03$. Therefore, also the coefficient of the fifth independent variable *Risk Tolerance* is not statistically significant. Consequently, the fifth hypothesis cannot be accepted. Although STEM talent anticipates a higher risk in regard to start-ups, the personal risk tolerance of engineers does not impact the perceived attractiveness of a start-up in job advertisements. On the contrary, Roach and Sauermann (2023, p. 14) found that STEM students and graduates in the United States who are more tolerant towards risk will also prefer to work in a start-up. Nevertheless, since the dimension *Uncertainty Avoidance* scores relatively high for Austrians and Germans, it is expected that the engineers in Austria and Germany who state a higher risk tolerance do still have a lower risk tolerance compared to STEM students and graduates in the United States (Hofstede Insights, 2024). Thus, the personal risk tolerance does not influence the preference for a start-up significantly.

To sum it up, while only the second hypothesis can be accepted, two control variables are additionally found as statistically significant. As elaborated earlier the coefficient of the variable *Salary Level 2* has a $p < 0.05$ and is therefore deemed as significant. Furthermore, the

control variable *Clarity Career* is with $p = 0$ highly statistically significant. Consequently, although only one of the five identified organisational and job factors has a statistical significance, the multiple regression model gives interesting insights into the preferences of engineers in Austria and Germany. The acceptance of the second hypothesis confirms previous studies and gives a great insight for job advertisements of start-ups. Start-ups should focus on describing their opportunities to advance and develop skills and competencies in a challenging work setting. Thereby, it is important to give also a clear understanding of career advancement possibilities.

Finally, the constant of the regression equation is negative and highly significant with $p = 0$ meaning that without stating any of the identified organisational and job factors, engineers do not tend to prefer the job advertisement of a start-up over the one of a corporation (Stoetzer, 2017, p. 32). Moreover, it is likely that other factors mentioned in the job advertisements that have not been tested in the regression analysis such as catering, pension schemes, and location may influence the preference for a corporation. Besides, presented but not tested factors such as work-life balance, flat hierarchies, and the aspect of sustainability may influence the preference for a start-up. Furthermore, also the wording is likely to impact the perceived attractiveness.

In summary, the findings provide valuable insights but also suggest the revaluation of the theoretical assumptions and highlight the need for further research. Therefore, the following section presents the limitations of this study as well as it gives suggestions for further research.

9.3. Limitations

The results of this study must be considered in the light of several limitations. To begin with, the participants of the online questionnaire were recruited from the professional platform *LinkedIn*. Therefore, the sample is likely to be biased since the data collection excludes the engineers in Austria and Germany who do not have an account on *LinkedIn*. Moreover, profiles with software engineering in their profile headlines have not been contacted on purpose. Consequently, no internal validity exists because of sample selection bias (Stoetzer, 2017, p. 238). Moreover, approximately 1200 profiles have been contacted and out of them 216 people took the survey. Therefore, the participants that took the survey did so voluntarily. This could further select the sample due to specific personal characteristics of respondents who are willing to support research and thus, take the survey.

Besides, the study is focused on engineers in Austria and Germany. Thus, it is not applicable to other populations, but it can serve as a basis for future research on engineers from different cultural backgrounds. Since the current research on *Employer Branding* in STEM recruitment is strongly based on U.S. studies, future research on other countries or regions could be interesting. Besides, although there exist several studies on *Employer Branding* and STEM recruitment, the research methodologies differ from the one in this thesis. The only similar research methodology was applied by Elving et al (2013), nevertheless, the research purpose was wider and not linked to one profession. Consequently, the comparison of this study to others is difficult due to different research methodologies as well as cultural settings.

Furthermore, four out of five independent variables do not have a statistically significant influence on the *Dependent Variable*. Therefore, it is likely that important factors have been omitted in the study. These omitted variables may considerably influence the results of the multiple regression equation (Stoetzer, 2017, p. 237). Thus, the results should be interpreted with caution. Furthermore, two independent variables have combined two different factors. First, the variable *Team Climate* measures the influence of collaboration and a positive team climate when described in the job advertisement. Second, the variable *Autonomy* assesses the impact of autonomy and responsibility. However, collaboration does not necessitate a positive team climate and vice versa. Also, the factors responsibility and autonomy are not necessarily interdependent. Consequently, the findings of the analysis for these two variables are potentially blurred. Moreover, the data collection was done in one point of time with one single method of data collection. Therefore, it does not provide longitudinal or more complex insights into the research and gives more weight to biases (Stoetzer, 2017, p. 237). Further research is required in order to support the findings as well as to test other organisational and job characteristics for their importance.

Additionally, the questionnaire itself has limitations. To start with, the 7-point Likert scale might encourage participants to give less extreme answers such as “strongly disagree” or “strongly agree” because more differentiated answer options are given. Moreover, the neutral answer category “neither agree nor disagree” in the middle of the scale can possibly dilute the answers (Menold and Bogner, 2015, p. 5). Besides, the vignettes may not have been clear enough. For example, one respondent wrote in the feedback box that it could have been interesting to assess the preference to work in an established company vs. in a startup which is depending on funding. Therefore, it is likely that only in a subtle manner the different types of organisations were apparent in the job advertisements. This could be because the distinctive

factors of start-ups have not been highlighted sufficiently. Nevertheless, the choice to not share with respondents which type of companies are behind the fictional job advertisements was taken in order to avoid potential bias. Therefore, it might be interesting for the future to conduct similar studies where the type of organisation is communicated to the respondents. Besides, the job advertisements were fictional and thus, no real brand was indicated in the research. Therefore, it did not allow to look at the true impact of *Employer Branding* on a particular brand (Elving et al, 2013, p. 369). However, the research purpose does not require a specific brand but aims to shed light on important features that should be mentioned by start-ups in job advertisements for engineers.

Moreover, despite the type of organisation and associated benefits, other factors may play a vital role in the forming of a preference for an employer. The industry in which an organisation is operating as well as the location may be crucial for the choice of an employer. The vignettes, however, did not provide any information on these factors. Last, salary figures had not been included in the vignettes due to the contacting of engineers who work in various positions with different hierarchies. Also, the respondents are living and working in different regions of Austria and Germany. Furthermore, the salary may differ significantly depending on the industry an individual is working in. Therefore, it is recommended not to include straightforward salary digits. However, this also did not allow to measure the impact of organisational and job factors when the salary is considerably smaller.

Finally, the study aims to capture the complex decision-making processes of engineers. Therefore, another research methodology could have been beneficial, too. Future researchers focussing on the impact of organisational and job factors in job advertisements should consider applying other methodologies such as conjoint analysis, longitudinal studies, and approaches with mixed methods or similar.

10. Conclusion and Outlook

This study researches the impact of five organisational and job characteristics on the decision of an engineer to work for a start-up. The overall research question guiding the study is as follows: *Under which conditions would an engineer choose to work for a start-up rather than for a corporation?* In doing so, the research focuses on engineers living and working in either Austria or Germany. The underlying theoretical concept applied was *Employer Branding* centred on the identification of a *P-O Fit*. Equivalent to the study of Tumasjan, Strobel, and Welp (2011, p. 111), this thesis examines the unique employment characteristics that start-ups can leverage to build and communicate actively in their *Employer Brands*. However, the study's research focus is on *Employer Branding* in job advertisements and on engineers. To formulate the hypotheses a thorough literature review of STEM recruitment has been conducted. The first four hypotheses proposed the positive influence of the following four factors on the perceived attractiveness of start-ups when stated in the job advertisement: *The Possibility to Work on Cutting-edge Technology*, *Personal Development Opportunities in a Challenging Work Setting*, *Positive and Collaborative Team Climate*, and *Personal Autonomy and Responsibility*. Lastly, the *Personal Risk Tolerance* of an engineer was expected to further influence the attractiveness of a start-up.

In summary, the *Employer Branding* aims to attract external talent that has a professional and cultural fit with the company as well as to retain internal talent by increasing the loyalty of employees (Stotz and Wedel, 2009, p. 25; Tanwar and Kumar, 2019, p. 802). The identification of a *P-O Fit* between organisation and employee is achieved “by providing employees (and potential employees) with a unique and attractive brand image of the employer” (Elving et al, 2013, p. 357). Therefore, job advertisements are major channels for communicating the *Employer Brand* by presenting engineers with organisational and job characteristics of the company. Once a potential employee identifies a *P-O Fit* between him/her and the respective company, the company appears as an attractive employer to him/her (Elving et al, 2013, p. 356). Thus, the survey evaluated whether the four identified factors are important for the respondents and if so, whether they would anticipate a better *P-O Fit* and prefer the job advertisement of the fictional start-up. Moreover, it tested whether personal risk tolerance was relevant for this preference. However, the results of the multiple regression analysis illustrate that only the second hypothesis can be accepted. The other four hypotheses did not yield statistically significant coefficients.

The coefficient of the independent variable *Development* has been found as statistically significant with $p < 0.01$. This result confirms previous research on STEM recruitment and offers valuable insights into the attraction of engineering professionals by start-ups. In Austria and Germany STEM talent and more dominantly engineering talent is in high demand. Therefore, it is essential for start-ups to attract engineering talent. With their limited resources, start-ups should focus on presenting potential employees with their distinctive characteristics. The *Personal Development of Skills and Competencies in a Challenging Work Setting* is thus important to be highlighted in their job advertisements. Moreover, the study found that career opportunities offered in a particular start-up should be stated clearly in a job advertisement.

As Boswell et al (2003) revealed in their study, different factors are important for potential employees in different stages of the recruitment process. Moreover, the concept of *Employer Branding* describes the wide scope of activities in order to present potential and current employees with an idea of an organisation's attributes and values (Elving et al, 2013, p. 370). Thus, it is important for start-ups to present the factor *Development* also throughout different processes and practices of the organisation (Elving et al, 2013, p. 370).

Furthermore, by communicating the company's cultural values, potential candidates can decide whether there exists a good fit between the employer and themselves as potential employees (Stotz and Wedel, 2009, p. 34). The identification of this fit is increasing intrinsic motivation and thus, the overall trust of a potential employee (Stotz and Wedel, 2009, p. 34). The trust into the promised cultural characteristics of an employer is playing a vital role throughout the whole employee life cycle because only when trusting into the employer, an employee can feel content and satisfied with his workplace, which in turn, results in loyalty of the employee towards the employer (Stotz and Wedel, 2009, p. 34). The actual confirmation of the cultural fit identified by the employee is thus increasing his loyalty towards the company (Stotz and Wedel, 2009, p. 34). By meeting the expectations and promises that have been communicated through the *Employer Brand*, the employee's decision is strengthened (Stotz and Wedel, 2009, p. 34; Ternès and Runge, 2016, p. 3). It is therefore important that these impressions also result in fulfilled expectations because if not, the dissatisfaction will lead to an opposite outcome within the employee (Elving et al, 2013, p. 358, 369; Stotz and Wedel, 2009, p. 31; Tanwar and Kumar, 2019, p. 803). When there exists no consistency between communicated and actual benefits, the received positive impressions are multiplied and converted to strong negative feelings towards an employer, thus resulting in losing existing and potential talent within a company (Stotz and Wedel, 2009, p. 31). Besides, the support and pride of existing employees for its

company's mission is a key factor for talent attraction and retention (Ternès and Runge, 2016, p. 3). Current employees that embody the brand are acting as ambassadors of the company and thus, as a major factor for a successful communication of an attractive *Employer Brand* (Martin, Gollan, and Grigg, 2011, p. 3619). Consequently, the opportunities for development should not merely be communicated by start-ups but also be developed thoroughly by the Human Resources department or other responsible persons. Following the findings of this study, it is expected that the enhancement of personal development possibilities with a clear process is increasing the perceived attractiveness of start-ups for potential as well as existing employees.

In conclusion, this thesis studies the impact of four organisational and job factors as well as of personal risk tolerance. The findings illustrate that the personal development of skills and competencies in a challenging work setting is increasing the attractiveness of start-ups when mentioned in their job advertisements. Further research is needed to build on these findings and to obtain more studies on the attraction of engineers. Nevertheless, the study adds on the research on *Employer Branding*. It demonstrates that *Employer Branding* is an important strategy and tool for start-ups in the *War for Talent*. The findings shall further guide start-ups on how to develop their *Employer Brand* when looking for engineering talent. By identifying the benefits that are considered as unique for start-ups, start-ups can focus on them and improve their overall organisational attractiveness as an employer. Future research should investigate other potentially important factors as well as apply other methodologies to provide further insight into the attraction of engineers to start-ups.

The following two subchapters give an outlook by introducing two approaches that are expected to further increase the attractiveness of start-ups once important organisational and job factors are identified.

10.1. Emotionalisation of the Employer Brand

According to Stotz and Wedel (2009, p. 31), many employers cannot differentiate themselves effectively from other competitors by rational means. However, by developing an *Employer Brand* that is emotionally engaging, the process of differentiation is increased (Stotz and Wedel, 2009, p. 31). It is increasing the identification of employees with their employer and thus, the loyalty towards the company (Stotz and Wedel, 2009, p. 32). By including the right measurements in the *Employer Branding* strategy, the emotional connectedness of an employee with his/her employer can increase employee satisfaction (Stotz and Wedel, 2009, p. 32). This,

in turn, is likely to improve the efficiency and quality of an employee's work as well as the overall talent retention (Elving et al, 2013, p. 357; Stotz and Wedel, 2009, p. 32). Furthermore, the positive emotional engagement of employees with a company's *Employer Brand* carries not only internal but also external benefits. While emotionalisation supports the choice of an employer, it also facilitates the retaining of talent by binding them emotionally to the company (Stotz and Wedel, 2009, p. 32). Therefore, start-ups should not only focus on the distinctive features that they provide but also at the emotional aspects. Since the majority of start-ups are pursuing sustainable, ecological, or social goals with the development of their products and processes, they should also communicate this strongly in their *Employer Brand*. Furthermore, the sustainable or social vision and goals of start-ups should be communicated to a large amount of people. In this regard the social media channels are important nowadays, because they provide access to a large number of people. This will be discussed shortly in the following section.

10.2. Employer Branding and Social Media

According to Muc and Schümchen (2021, p. 94), around one quarter of the start-ups that have been examined in their study do not report any social media communication. Following the authors, reasons could be less personnel resources as well as time limitations (Muc and Schümchen, 2021, p. 94). However, the presence on social media is likely to significantly increase the visibility of a company (Tanwar and Kumar, 2019, p. 801). Also, Ternès and Runge (2016, p. 13) highlight the importance of the presentation of a company's *Employer Brand* on social media. Since start-ups are commonly less known by people compared to large corporations, it is important for them to leverage available social media channels. The activity on social media may enhance the communication of specific job factors as well as of emotional reason to join a start-up with potential employees (Tanwar and Kumar, 2019, p. 801). Moreover, while most marketing tools are considered as expensive, social media allows a multitude of affordable and diverse communication channels (Stotz and Wedel, 2009, p. 35). The communication on social media is not only a budget-friendly approach for presenting the positive organisational and job characteristics of a start-up but it also enables the quick counteraction of negative publicity in times of crises (Ternès and Runge, 2016, p. 13). In summary, the external *Employer Branding* is essential for start-ups to attract talents, and the social media allows to leverage it and to reach out to a large number of people. Consequently, it is highly recommended that start-ups first identify their key propositions they have to

engineers and then to highlight them in job advertisements as well as on social media. In doing so, the social media channels can enable especially small and innovative companies to reach a high visibility when applied under the framework of a well-developed *Employer Branding* strategy.

In conclusion, the success of start-ups is essential for encountering today's and future crises and it is an important factor for the health of our economies. Therefore, it is hoped that an increasing number of start-ups will focus their resources on *Employer Branding* and thus, may facilitate their talent attraction and economic success.

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Appendix

Appendix A: The Survey

Dear participants,

I am writing my Master's thesis at the Department of Business Decisions and Analytics at the University of Vienna.

The focus of my thesis is on organisational and job characteristics that influence an engineer's decision when choosing an employer.

This questionnaire is directed towards engineers who live and work in either Austria or Germany.

It will take you approximately 5-10 minutes to complete.

The data you provide will be treated confidentially in compliance with data protection laws and to protect your privacy.

If you have any questions, please do not hesitate to contact me by e-mail (a12038111@unet.univie.ac.at).

Thank you for your support!

Kind regards,

Lena Violetta Werner

-
1. Which country do you currently live in?

Austria / Germany / Other

2. In which country are you officially employed?

Austria / Germany / Other

3. Do you consider yourself an engineer?

Yes, I am an engineer / No, I am not an engineer

4. To work in an innovative environment on cutting-edge or new technology is an important factor for me when choosing an employer.

(Cutting-edge technology refers to the latest, most advanced technology currently available, which has been tested and proven to some extent.)

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

5. To develop my skills and competencies in a challenging work setting is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

6. A clear idea of given career advancement opportunities is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

7. A positive and collaborative team climate is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

8. To receive responsibility and autonomy at work is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

9. Job security is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

10. Income security in order to be able to finance a good standard of living now and in the future is an important factor for me when choosing an employer.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

11. I am prepared to accept a higher level of risk in terms of job and income security in order to work on an innovative project.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

Vignette Study

In the next step, you will see two extracts of the job advertisements of Firm A and Firm B for an engineering position.

The displayed sections show the parts of the job advertisements in which the two fictitious companies present themselves and their offers to potential candidates.

Please try to focus on each job advertisement, as you will be asked several questions about them afterwards.

Note: You can go back and look at the job advertisements again at any time.

Firm A

Are you hungry for a challenge? We are always looking for like-minded professionals ready to join our revolution!

We offer exciting and diverse projects in a new technology environment, a steep learning curve, and a company culture characterised by personal relationships and collaboration.

Joining our mission is your opportunity for being part of a purposeful journey and individual growth! You take on responsibility from day one and actively shape our company with your own ideas. You work in a flat hierarchy with an open and transparent communication culture.

We are a loyal and fun-loving, international team and organise regular team events.

Together, we revolutionise our industry!

What we offer:

- Regular team events and a great team spirit and family atmosphere, collaborating with innovative and talented individuals from around the world
- A high degree of independence, creative freedom, and personal responsibility
- The most exciting job you will ever have, work in an innovative environment with cutting-edge technologies
- We respect your work-life balance with flexible working hours and home office options
- Opportunity to develop yourself in a wide range of topics and in a fast-growing company
- Flat hierarchies and short decision cycles
- Chance to shape a better and more sustainable future
- A creative environment with the opportunity to contribute your own ideas
- Competitive salary and benefits such as public transport ticket, regular fresh fruit, free drinks, sports membership, lots of fun group activities

Firm B

Are you looking for new professional challenges?

As an internationally successful company, we offer you a secure job, a unique variety of tasks and long-term development opportunities.

We offer an impressive, varied and global working environment in which you can develop personally. We invest in our people and provide them with the support and resources they need to succeed because we believe that your career path should be as individual as you are.

With our unique material and technology expertise, we develop trend-setting and sophisticated solutions.

We are looking for talented people who want to contribute to the development of market-leading technologies and want to help shape the future of our networked world.

What we offer:

- Close collaboration with colleagues in other departments and locations
- Be part of a world class team, numerous offers for personal development and tailored training programmes
- Opportunity to actively contribute to the success of Firm B and create value
- To work in an international and multicultural environment which fosters continuous development, diversity and innovation
- To benefit from a hybrid working environment and good work-life balance supported by flexible working hours and the option of working from home

- Subsidised healthy & regional catering in the company restaurant, 30 days of vacation, various employee discounts and several company events
- Company pension scheme with attractive employer contributions health management programmes and sports programme
- Great location, free parking and charging stations for electric cars, bike leasing, and public transport subsidy
- Attractive remuneration package depending on your qualifications and experience, with possibility for overpayment

12. In terms of working in an innovative environment with cutting-edge technology, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

13. In regard to the offered advancement opportunities, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

14. Please select 'strongly disagree' to indicate that you are paying attention to this question.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

15. The job advertisement of Firm A gives me a clearer idea of given career advancement opportunities than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

16. In regard to the described team climate, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

17. In terms of receiving autonomy and responsibility in the job role, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

18. In regard to job security, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

19. In regard to income security, the job advertisement of Firm A appeals to me more than the job advertisement of Firm B.

Strongly disagree / disagree / Somewhat disagree / Neither agree nor disagree / Somewhat agree / Agree / Strongly agree

20. Based on the information provided in the job advertisements of Firm A and Firm B, please indicate which company you find more attractive as an employer.

Firm A appears more attractive to me than Firm B / Firm B appears more attractive to me than Firm A / Neither company seems to be an attractive employer for me / Both are equally attractive employers for me

Sociodemographic Characteristics

21. Which gender do you identify with?

Female / male / diverse

22. How old are you?
-

23. Do you have children?

Yes, I do have children. / No, I do not have children.

24. What is your nationality?
-

25. What is the highest level of education you have completed?

High school diploma, A-levels, or similar / University degree, i.e. Bachelor diploma or Master diploma / PhD and higher / Other

26. In which field of engineering are you working?

Civil engineering / Mechanical engineering / Chemical engineering / Electrical engineering / Industrial engineering / Other

27. What is your hierarchical level in your company?

I am still in school or training / Entry-level / Experienced / Team Lead / Manager / Other

28. What is your monthly gross salary on fulltime basis? (Gross salary is defined as the total amount of pay a person has earned before tax and social security deductions.)

less than €3,000 / €3,000 up to €3,999 / €4,000 up to €4,999 / €5,000 or more / I do not wish to answer

29. Would you like to comment this questionnaire?

Thank you for completing this questionnaire!

I would like to thank you very much for helping me.

In case of any questions, please feel free to contact me via following e-mail address:
a12038111@unet.univie.ac.at

Your answers were transmitted, you may close the browser window or tab now.

Appendix B: Descriptive Statistics

Table 11 Distribution Technology (IV)

Technology	Freq.	Percent	Cum.
1	1	0.76	0.76
2	5	3.82	4.58
3	5	3.82	8.40
4	16	12.21	20.61
5	27	20.61	41.22
6	61	46.56	87.79
7	16	12.21	100.00
Total	131	100.00	

Table 12 Detailed Descriptive Statistics of Technology

B101_Tech				

Percentiles		Smallest		
1%	2	1		
5%	3	2		
10%	4	2	Obs	131
25%	5	2	Sum of wgt.	131
50%	6		Mean	5.366412
		Largest	Std. dev.	1.253954
75%	6	7		
90%	7	7	Variance	1.572402
95%	7	7	Skewness	-1.163695
99%	7	7	Kurtosis	4.208871

Table 13 Distribution of Development (IV)

Development	Freq.	Percent	Cum.
2	2	1.53	1.53
4	3	2.29	3.82
5	18	13.74	17.56
6	65	49.62	67.18
7	43	32.82	100.00
Total	131	100.00	

Table 14 Detailed Descriptive Statistics of Development

B102_Dev				

Percentiles		Smallest		
1%	2	2		
5%	5	2		
10%	5	4	Obs	131
25%	6	4	Sum of wgt.	131
50%	6		Mean	6.083969
		Largest	Std. dev.	.8947554
75%	7	7		
90%	7	7	Variance	.8005872
95%	7	7	Skewness	-1.652481
99%	7	7	Kurtosis	8.079698

Table 15 Distribution of Team Climate (IV)

Team Climate	Freq.	Percent	Cum.
1	1	0.76	0.76
2	2	1.53	2.29
3	2	1.53	3.82
5	12	9.16	12.98
6	29	22.14	35.11
7	85	64.89	100.00
Total	131	100.00	

Table 16 Detailed Descriptive Statistics of Team Climate

B103_Team				

Percentiles	Smallest			
1%	2	1		
5%	5	2		
10%	5	2	Obs	131
25%	6	3	Sum of wgt.	131
50%	7		Mean	6.412214
		Largest	Std. dev.	1.073243
75%	7	7		
90%	7	7	Variance	1.15185
95%	7	7	Skewness	-2.675633
99%	7	7	Kurtosis	11.36844

Table 17 Distribution of Autonomy (IV)

Autonomy	Freq.	Percent	Cum.
2	1	0.76	0.76
3	2	1.53	2.29
4	7	5.34	7.63
5	18	13.74	21.37
6	64	48.85	70.23
7	39	29.77	100.00
Total	131	100.00	

Table 18 Detailed Descriptive Statistics of Autonomy

B104_Autonomy				

Percentiles	Smallest			
1%	3	2		
5%	4	3		
10%	5	3	Obs	131
25%	6	4	Sum of wgt.	131
50%	6		Mean	5.977099
		Largest	Std. dev.	.9564811
75%	7	7		
90%	7	7	Variance	.9148561
95%	7	7	Skewness	-1.278035
99%	7	7	Kurtosis	5.310136

Table 19 Distribution of Risk Tolerance (IV)

Risk Tolerance	Freq.	Percent	Cum.
1	7	5.34	5.34
2	18	13.74	19.08
3	19	14.50	33.59
4	21	16.03	49.62
5	29	22.14	71.76
6	27	20.61	92.37
7	10	7.63	100.00
Total	131	100.00	

Table 20 Detailed Descriptive Statistics of Risk Tolerance

B107_Risk				

Percentiles		Smallest		
1%	1	1		
5%	1	1		
10%	2	1	Obs	131
25%	3	1	Sum of wgt.	131
50%	5		Mean	4.282443
		Largest	Std. dev.	1.688307
75%	6	7		
90%	6	7	Variance	2.850382
95%	7	7	Skewness	-.2469937
99%	7	7	Kurtosis	2.042379

Table 21 Distribution of Preference Technology (Unstandardised)

Pref_Tech	Freq.	Percent	Cum.
1	2	1.53	1.53
2	19	14.50	16.03
3	13	9.92	25.95
4	14	10.69	36.64
5	15	11.45	48.09
6	50	38.17	86.26
7	18	13.74	100.00
Total	131	100.00	

Table 22 Descriptive Statistics of Preference Technology

Variable	Obs	Mean	Std. Dev.	Min	Max
Pref Technology	131	4.855	1.728	1	7

Table 23 Detailed Descriptive Statistics of Preference Technology

Pref_Tech				

Percentiles		Smallest		
1%	1	1		
5%	2	1		
10%	2	2	Obs	131
25%	3	2	Sum of wgt.	131
50%	6		Mean	4.854962

		Largest	Std. dev.	1.728148
75%	6	7		
90%	7	7	Variance	2.986494
95%	7	7	Skewness	-.5919851
99%	7	7	Kurtosis	2.027041

Table 24 Distribution of Preference Development (Unstandardised)

Pref_Dev	Freq.	Percent	Cum.
1	5	3.82	3.82
2	38	29.01	32.82
3	19	14.50	47.33
4	22	16.79	64.12
5	23	17.56	81.68
6	20	15.27	96.95
7	4	3.05	100.00
Total	131	100.00	

Table 25 Descriptive Statistics of Preference Development

Variable	Obs	Mean	Std. Dev.	Min	Max
Pref Development	131	3.733	1.631	1	7

Table 26 Detailed Descriptive Statistics of Preference Development

Pref_Dev					

Percentiles		Smallest			
1%	1	1			
5%	2	1			
10%	2	1	Obs	131	
25%	2	1	Sum of wgt.	131	
50%	4		Mean	3.732824	
		Largest	Std. dev.	1.630594	
75%	5	7			
90%	6	7	Variance	2.658837	
95%	6	7	Skewness	.2004518	
99%	7	7	Kurtosis	1.831747	

Table 27 Distribution of Preference Team Climate (Unstandardised)

Pref_Team	Freq.	Percent	Cum.
1	2	1.53	1.53
2	17	12.98	14.50
3	13	9.92	24.43
4	17	12.98	37.40
5	23	17.56	54.96
6	42	32.06	87.02
7	17	12.98	100.00
Total	131	100.00	

Table 28 Descriptive Statistics of Preference Team Climate

Variable	Obs	Mean	Std. Dev.	Min	Max
Pref Team Climate	131	4.802	1.661	1	7

Table 29 Detailed Descriptive Statistics of Preference Team Climate

Pref_Team				

Percentiles	Smallest			
1%	1	1		
5%	2	1		
10%	2	2	Obs	131
25%	4	2	Sum of wgt.	131
50%	5		Mean	4.801527
	Largest		Std. dev.	1.661417
75%	6	7		
90%	7	7	Variance	2.760305
95%	7	7	Skewness	-.5309215
99%	7	7	Kurtosis	2.128966

Table 30 Distribution of Preference Autonomy (Unstandardised)

Pref_Autono	Freq.	Percent	Cum.
my			
1	2	1.53	1.53
2	18	13.74	15.27
3	14	10.69	25.95
4	21	16.03	41.98
5	17	12.98	54.96
6	50	38.17	93.13
7	9	6.87	100.00
Total	131	100.00	

Table 31 Descriptive Statistics of Preference Autonomy

Variable	Obs	Mean	Std. Dev.	Min	Max
Pref Autonomy	131	4.672	1.624	1	7

Table 32 Detailed Descriptive Statistics of Preference Autonomy

Pref_Autonomy				

Percentiles	Smallest			
1%	1	1		
5%	2	1		
10%	2	2	Obs	131
25%	3	2	Sum of wgt.	131
50%	5		Mean	4.671756
	Largest		Std. dev.	1.624063
75%	6	7		
90%	6	7	Variance	2.637581
95%	7	7	Skewness	-.5096394
99%	7	7	Kurtosis	2.021891

Table 33 Distribution of Binary Variable Preference Firm A

binary_preference==	Freq.	Percent	Cum.
1.0000			
0	88	67.18	67.18
1	43	32.82	100.00
Total	131	100.00	

Table 34 Spearman's Rank Correlation of DV and IVs

	Dependent_~e	Techno~y	Develo~t	Team_C~e	Autonomy	Risk_T~e
Dependent_~e	1.0000 .					
Technology	0.0424 0.6306	1.0000 .				
Development	0.1808* 0.0389	0.3906* 0.0000	1.0000 .			
Team_Climate	-0.0362 0.6807	0.1107 0.2082	0.1315 0.1343	1.0000 .		
Autonomy	0.0967 0.2716	0.3098* 0.0003	0.3594* 0.0000	0.1364 0.1205	1.0000 .	
Risk_Toler~e	0.0283 0.7479	0.4061* 0.0000	0.3193* 0.0002	-0.1762* 0.0441	0.1876* 0.0320	1.0000 .

Table 35 Distribution of Clarity Career (CV)

Clarity Career	Freq.	Percent	Cum.
1	7	5.34	5.34
2	45	34.35	39.69
3	29	22.14	61.83
4	23	17.56	79.39
5	12	9.16	88.55
6	11	8.40	96.95
7	4	3.05	100.00
Total	131	100.00	

Table 36 Descriptive Statistics of Clarity Career

Variable	Obs	Mean	Std. Dev.	Min	Max
Clarity Career	131	3.282	1.51	1	7

Table 37 Detailed Descriptive Statistics of Clarity Career

Clarity_Career				

	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	2	1	Obs	131
25%	2	1	Sum of wgt.	131
50%	3		Mean	3.282443
		Largest	Std. dev.	1.510348
75%	4	7		
90%	6	7	Variance	2.281151
95%	6	7	Skewness	.7099674
99%	7	7	Kurtosis	2.660979

Table 38 Distribution of Risk Preference (CV)

Risk Preference	Freq.	Percent	Cum.
1	12	9.16	9.16
1.5	8	6.11	15.27
2	41	31.30	46.56
2.5	14	10.69	57.25

3	10	7.63	64.89
3.5	11	8.40	73.28
4	9	6.87	80.15
4.5	9	6.87	87.02
5	4	3.05	90.08
5.5	7	5.34	95.42
6	5	3.82	99.24
7	1	0.76	100.00
Total	131	100.00	

Table 39 Descriptive Statistics of Risk Preference

Variable	Obs	Mean	Std. Dev.	Min	Max
Risk Preference	131	2.912	1.42	1	7

Table 40 Detailed Descriptive Statistics of Risk Preference

Risk_Preference				

Percentiles		Smallest		
1%	1	1		
5%	1	1		
10%	1.5	1	Obs	131
25%	2	1	Sum of wgt.	131
50%	2.5		Mean	2.912214
		Largest	Std. dev.	1.420294
75%	4	6		
90%	5	6	Variance	2.017234
95%	5.5	6	Skewness	.7668484
99%	6	7	Kurtosis	2.697031

Table 41 Distribution of Preference Job Security

Pref_Job Security	Freq.	Percent	Cum.
1	23	17.56	17.56
2	52	39.69	57.25
3	20	15.27	72.52
4	12	9.16	81.68
5	9	6.87	88.55
6	14	10.69	99.24
7	1	0.76	100.00
Total	131	100.00	

Table 42 Distribution of Preference Income Security

Pref_Income Security	Freq.	Percent	Cum.
1	19	14.50	14.50
2	43	32.82	47.33
3	27	20.61	67.94
4	20	15.27	83.21
5	8	6.11	89.31
6	12	9.16	98.47
7	2	1.53	100.00
Total	131	100.00	

Table 43 Descriptive Statistics for the Whole Model

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable	131	.066	.62	-1.33	1.4
Technology	131	5.366	1.254	1	7
Development	131	6.084	.895	2	7
Team Climate	131	6.412	1.073	1	7
Autonomy	131	5.977	.956	2	7
Risk Tolerance	131	4.282	1.688	1	7
Age	131	32.099	5.411	22	53
High School	131	.023	.15	0	1
University Degree	131	.908	.29	0	1
Salary Level 1	131	.038	.192	0	1
Salary Level 2	131	.076	.267	0	1
Salary Level 3	131	.282	.452	0	1
Salary Level 4	131	.527	.501	0	1
Clarity Career	131	3.282	1.51	1	7
Risk Preference	131	2.912	1.42	1	7

Table 44 Spearman's Rank Correlation Coefficients for the Whole Model

	DV	Tech	Dev	Team	Auton	Risk_ Tol.	Age	High_ Sch.	Unive rsity	Salar y~1	Salar y~2	Salar y~3	Salar y~4	Clarit y Car.	Risk_ Pref.
DV	1.000														
Tech	0.042	1.000													
Dev	0.181	0.391	1.000												
Team	-	0.036	0.111	1.000											
Auton	0.097	0.310	0.359	0.136	1.000										
Risk Tol.	0.028	0.406	0.319	-	0.176	1.000									
Age	0.044	-	-	-	-	-	1.000								
High Sch.	0.084	-	-	0.019	0.084	0.023	0.089	1.000							
Unive rsity	0.098	-	0.031	-	0.070	0.118	0.043	-	1.000						
Salar y~1	-	-	0.005	0.047	-	0.214	0.173	-	0.030	1.000					
Salar y~2	0.198	0.052	0.051	0.059	-	0.078	0.025	0.148	-	0.057	1.000				
Salar y~3	-	-	-	-	-	-	-	-	-	-	-	1.000			
Salar y~4	0.018	0.148	0.190	0.101	0.100	0.145	0.124	0.096	0.140	0.125	0.180	-	1.000		
Clarit y Car	0.465	0.162	0.011	-	-	0.132	0.015	0.157	-	0.115	0.134	0.019	-	1.000	
Risk Pref.	0.279	0.176	0.039	-	-	0.286	0.008	0.057	0.018	0.054	0.157	0.036	-	0.482	1.000

Figure 4 CPR Plot DV vs. Technology

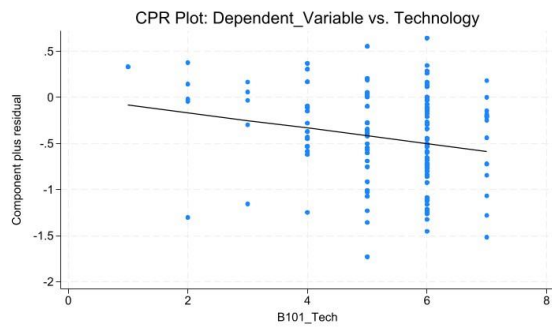


Figure 5 CPR Plot DV vs. Development

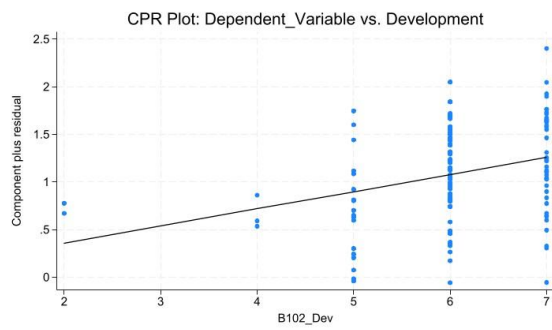


Figure 6 CPR Plot DV vs. Team Climate

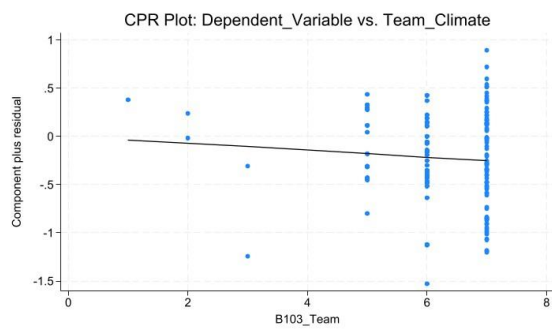


Figure 7 CPR Plot DV vs. Autonomy

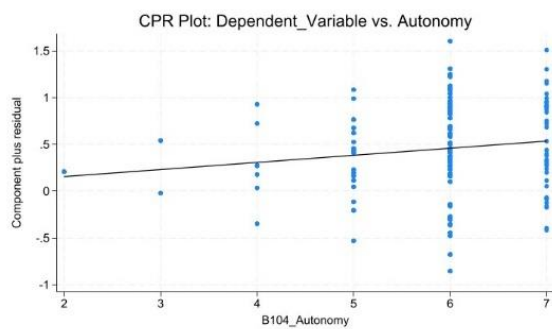


Figure 8 CPR Plot DV vs. Risk Tolerance

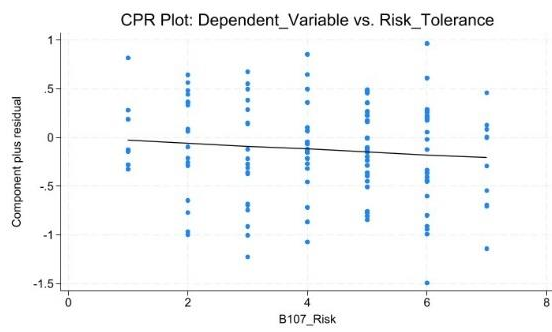


Figure 9 Rvf Plot Residuals vs. Fitted Values

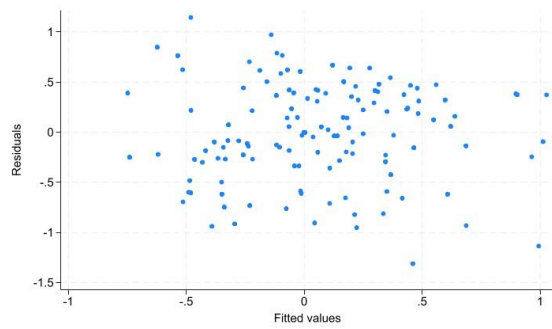


Figure 10 Q-Q Plot of Standardised Residuals

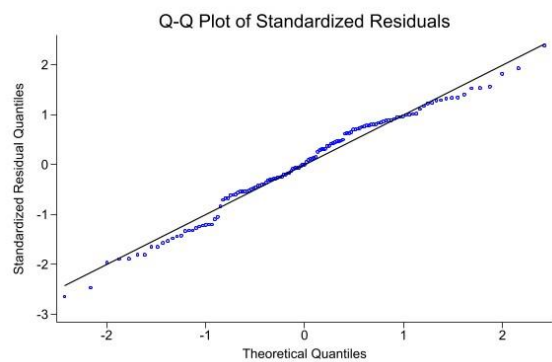


Table 45 Variance Inflation Factor

	VIF	1/VIF
Salary Level 4	4.786	.209
Salary Level 3	4.057	.247
Salary Level 2	2.014	.497
Salary Level 1	1.767	.566
Development	1.754	.57
High School	1.715	.583
Risk Tolerance	1.703	.587
Autonomy	1.616	.619
Technology	1.59	.629
Team Climate	1.523	.657
Risk Preference	1.514	.661
University Degree	1.449	.69
Clarity Career	1.395	.717
Age	1.279	.782
Mean VIF	2.011	.