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CHARACTERISTICS OF INFORMAL VENTURE CAPITAL IN THE CZECH REPUBLIC: QUANTITATIVE APPROACH

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Abstract

In this paper, the demographic and investment profiles of business angels operating in the Czech Republic are evaluated based on a sample of 78 angel investors. This is the first attempt to use data on investor activities from the Pitchbook database, which has become increasingly popular in academic research. Beyond the framework of descriptive statistical analysis, a multidimensional statistical investigation using cluster analysis was conducted. The results show that there are two groups of angel investors in the Czech Republic. The first group is represented by investors who predominantly have a large active portfolio, as well as the number of total completed investments. On the other hand, the second cluster is made up of investors who conduct a smaller number of investments and are also in the position of the founder of a start-up. Not surprisingly, there are two main locations of angel investors in the Czech Republic, Brno and Prague. Both categories of typical investors are united by some demographic characteristics; for example, the market is dominated by middle-aged men with a completed Master's degree in Economics who invest in start-ups in the field of information and communication technologies. The main contribution of the paper consists in evaluating the demographic and investment profiles of angel investors operating in the Czech business environment. The results of the research have implications for upcoming research, the informal venture capital industry, and public policy beyond the Czech business environment, while developing tools for fostering an angel ecosystem. In today's globalized world, the boundaries of angel investors are often blurred. Just as start-ups have ambitions to expand internationally, informal venture capitalists are increasingly making cross-border

deals. From the perspective of both investee firms and policy makers, it is thus important to know the profiles of not only domestic but also foreign business angels, e.g. with regard to the setting of public support for foreign capital inflows.

Keywords: business angels, angel investor, venture capital, informal venture capital, characteristics, cluster analysis, Czech Republic

1. INTRODUCTION

The sector of small and medium enterprises (SMEs) forms the "backbone" of world economies (Filipe, Grammatikos & Michala, 2016; Turner & Ledwith, 2016; Wetzel, 1983); however, in terms of their size, these enterprises have difficult access to financing with the help of bank loans (Sonius, Kehrel & Yerkes, 2015; Reverte & Badillo, 2019) or venture capital funds (Reitan & Sorheim, 2000). This is where business angels (BAs) come into play, creating a superstructure on the venture capital market beyond the framework of the "3F" financing, i.e. founder, friends, family (Conti, Thursby & Thursby, 2013), thereby filling the gap in financing SMEs with external financial capital (Wetzel, 1983). Generally, business angels are middle-aged men with a high net worth who invest part of their assets in high-risk business plans (Freea, Sohl & Wetzel, 1994; Mason and Harrison, 2008). These are previously successful entrepreneurs and managers in high-ranking positions (Becker-Blease & Sohl, 2007), who have closed their business in this area and invest on the venture capital market in newly emerging or start-up businesses (Mason & Harrison, 1996), in which they have no family connection (Chahine, Filatotchev & Wright, 2007). In addition to financial capital, the business angel also brings knowledge, skills, know-how, or contacts to the company, which creates the smart money (Politis, 2008; Sohl, 1999). However, despite the considerable importance of business angels and regarding the macroeconomic development and growth of individual economies, research on this is underdeveloped and unresearched (Zinecker, Skalicka, Balcerzak & Pietrzak, 2021a; 2021b) within the basic characteristics of the phenomenon, as well as specifically regarding the life cycle of venture capital investment by a business angel (Azarmi, 2016; Carpentier & Suret, 2015; Rigamonti, Cefis, Meoli & Vismara, 2016; White and Dumay, 2017).

As for the characteristics of a business angel, it is pivotal for the market, from the point of view of the investor, the recipient of capital, and the policy makers who can directly influence the market of business angels (Zinecker et al., 2021a, 2021b). Moreover, as Mason, Botelho and Harrison (2019) states, the person of a business angel changes and evolves, so conclusions valid in the past may not apply today. In terms of research on BAs, it is necessary to refer that as a population, they operate practically hidden and anonymous, which means that it is very difficult to analyse these people (Prowse, 1998; World Bank Group, 2018). In the world context, the issue of the characteristics of business angels was dealt with by the following authors: Wetzel (1983): USA, Wong and Ho (2007): Singapore, Li, Shi, Wu, Wu and Zheng (2013): China, Romaní, Attienza and Amorós (2013): Chile,

in the European context it is mainly: Šarić and Krstičević (2018): Croatia, Reitan and Sorheim (2000): Norway, Mason and Botelho (2014): Great Britain, Mason et al. (2019): Scotland, Lathi (2011): Finland, Stedler and Peters (2010): Germany. Specifically, for the territory of the Czech Republic (CZ), the phenomenon was dealt with in scientific articles by Zinecker et al. (2021a, 2021b) or World Bank Group (2018). Šarić and Krstičević (2018) analysed the characteristics of business angels into three categories, firstly, socio-demographic data, secondly, the investment profile and thirdly, the investment motivation of BAs. The authors of these studies mainly used quantitative research and analysis of primary data in the form of a basic description of results or correlation analyses, excluding Lathi (2011), who used multivariate statistical methods, specifically a cluster analysis of the characteristics of business angel investment in Finland.

The scientific publications of the above authors were divided by the authors Šarić and Krstičević (2018) into three categories of research on the characteristics of BAs, namely socio-demographic data, investment profile, and investor motivation in various decision-making areas. In the Czech environment, it can be stated that the investment profile category in the context of the BAs market is unresearched. Zinecker et al. (2021a, 2021b) provided conclusions especially for the first and third categories, where the authors subsequently state that there is not enough knowledge about the informal venture capital market, i.e. BAs in the Czech Republic, as there is no database that would systematically capture data on their investment activities in terms of the number of deals, volume, structure, type of investment, forms of output or industry (Zinecker et al., 2021b). In addition, these authors used primary data of a sample of 31 respondents, qualitative research in the form of semi-structured interviews, and descriptive data analysis, or a correlation matrix (Zinecker et al., 2021b) for their conclusions.

The aim of this paper is to expand the current state of scientific knowledge at the level of the business angel sociodemografic and investment profile and, within the framework of defining the typical person of the angel investor in the Czech Republic. For this purpose, a quantitative approach and secondary data are used, namely a descriptive and multidimensional or cluster analysis of almost eighty Czech business angels determined according to the parameters of their investment opportunities selected from the Pitchbook database, when the research builds on the results of previous studies (e.g., Skalicka, Zinecker, Balcerzak & Pietrzak, 2022; Zinecker et al., 2021a, 2021b).

The results are interpreted on the basis of a tabular representation and description of the data, including absolute and relative frequencies. The results are significant for the supply (angel investors) and demand (start-ups) side of the informal venture capital market, as well as policy makers. Just as start-ups have ambitions to expand internationally, informal venture capital investors perform cross-border contracts. For this reason, it is important for companies seeking venture capital to be able to identify regional and foreign investors. This knowledge is also important for the policy makers with regard to the correct setting of support for foreign investors with the aim of increasing the inflow of foreign capital. On

the basis of these facts, the following research questions have been selected with the purpose of "closing" the research gap in BA research in the Czech Republic. (RQ1): *"What are the sociodemographic characteristics of business angels in the Czech Republic, resulting from secondary data and quantitative research?*"; (RQ2): *"What is the profile of investments realised by business angels in the Czech Republic between 2013 and 2021?";* (RQ3): *"How can the person of a business angel be clustered in the Czech Republic?"*

The research, answering the research questions and describing the results is preceded by an extensive literature review in the form of an evaluation of the current state of knowledge in the field of the characteristics of business angels in the global and Czech context and the definition of a methodological framework. This is followed by a discussion of the findings of the literature review with the own conclusions of this article, and finally a summary overview of the article is defined in the conclusion, including an evaluation of the fulfilment of the objectives.

2. THEORETICAL BACKGROUND

Venture capital is an important source of external financing for SMEs, as these enterprises, by virtue of their size, have difficulty accessing bank loans (Sonius et al., 2015; Wonglimpiyarat, 2009). In the case of venture capital, equity financing is directed to start-up or emerging companies, where the investor has a high level of risk in the investment, but on the other hand, also a high potential for growth of the company, which is associated with above-average appreciation of the investment. Based on the provision of funds, the investor usually acquires a stake in the business (Akhmejanova, Vikulina, Votchel, Ivashina & Kuznetsova, 2015; Iyer, 2020). According to Scheela, Isidro, Jittrapanun & Trang (2015), there are two types of venture capital investors: firstly, it is a formal or institutionalised venture capital investor, the so-called venture capitalist, where it is usually private or public funds accumulating financial means (Pierrakis & Saridakis, 2017; Roggi, Gianozzi, Baglioni & Pagliai, 2019), and secondly, it is an informal or non-institutionalised venture capital investor in the form of business angels. The basic building block for the characteristics of informal venture capital, i.e. business angels, was laid about forty years ago by Wetzel (1984) in his pioneering study when he characterised the informal venture capital market in the United States, specifically in the territory of New England.

According to Wetzel (1984), the venture capital market is composed of three segments: the public equity market, the professional venture capital market, and the market for informal venture capital (business angels), where on the supply side of the informal venture capital market, there are business angels as private venture capital investors, or providers of external financial capital, and on the demand side, there are technological enterprises of small (Wetzel, 1984), but also medium-sized businesses, which serve as the "backbone" of both European and American economies (Filipe et al, 2016; Turner & Ledwith, 2016; Wetzel, 1984). The BAs market has its own particularities compared to the other two; it operates

inefficiently and invisibly, which means that not all relevant information about financial resources and investment opportunities is available to both buyers and sellers (Wetzel, 1984), or the supply and demand sides. This is related to, among other things, the theory of information asymmetry in the form of adverse selection and moral hazard, which can be simply defined as a condition where one party has more information than the other (Akerlof, 1970). Investors exceed the entrepreneur's knowledge of financing, whereas the entrepreneur has complete knowledge of the business and its processes (Glücksman, 2020; Joudi, Mansourfar & Didar, 2019; Landström; 2017).

However, despite the considerable importance of SMEs in the growth of global economies and businesses themselves, access to capital financing for these entities is difficult (Cosh, Cumming & Hughes, 2009; Reverte & Badillo, 2019; Sonius et al., 2015), especially in terms of bank loans (Sonius et al., 2015; Wonglimpiyarat, 2009). This is where business angels come into play, providing equity financing beyond the "3F" or "FFF", i.e. founder, friends and family, and thus closing the financing gap for innovative businesses in the SME sector (Conti et al., 2013; Wetzel, 1984), thereby contributing significantly to the growth of individual economies from a macroeconomic perspective. In general, an angel investor can be characterised as an individual, specifically a middle-aged, high net worth male who invests surplus funds in emerging or start-up businesses with high investment risk but also high potential for future business growth, where they have no family connections. This is to some extent an invisible population of venture capital investors, as BAs typically seek to operate anonymously, for example to protect investment strategy (Freear et al., 1994; Prowse 1998; Wetzel, 1984; World Bank Group, 2018). According to Sohl (1999), business angels are previously successful entrepreneurs or managers in high-ranking positions and bring expertise, skills, experience, know-how, and contacts to the venture beyond financial capital, thus actively engaging in the venture and adding value to the financing by the informal venture capital investor (Mason & Harrison, 2008; Politis, 2008).

Since the publication of the basic characteristics of BAs and the definition of the concept of informal venture capital by Wetzel (1984), research on the BAs market has undergone a gradual evolution in various areas of interest to the research community until 1999. This year is associated with a significant expansion of business angel research, particularly in conjunction with the founding of Venture Capital magazine by Mason and Harrison, and it was they who became the seminal authors within venture capital research, which has continued to this day (White & Dumay, 2017). Mason and Harrison (1999) divided the area of research interest in BAs into three generations. The first generation of the early 1990s focused on a basic description of the profile of investor and project markets (Freear et al., 1994; Mason & Harrison, 1996; Prowse, 1998; Wetzel, 1984). Second-generation research involves decision-making processes, monitoring investments in the phase following the investment, evaluating investment returns or exit, including the choice of a specific exit strategy (Azarmi, 2016; Félix, Pires & Gulamhussen, 2014; Giot & Schwienbacher, 2007; Wenhui, 2016), both from the investor's and the

company's perspective (Wiltbank, 2005). The third generation includes a more in-depth typology of investors (Block, Fisch, Vismara & Andres, 2019; Duxbury, George & Riding, 1996; Murnieks, Cardon, Sudek, White & Brooks, 2015), an analysis of business angel networks (Mason, Botelho & Harrison, 2016), a geographical perspective, the role of BAs in technology firms (Conti et al., 2013), or an external funding perspective (Mason & Harrison, 1999).

White and Dumay (2017) built on Mason and Harrison's 1999 definition of generations of research and defined a fourth generation of research on BAs based on a bibliometric analysis of selected relevant sources. The results indicate that an area of interest for the fourth generation consists in the effectiveness of government policies and their programmes (Mason & Harrison, 2015; Mason, 2009), crowdfunding (e.g., Grundy & Ohmer, 2016; Lukkarinen, 2015; Ordanini et al, 2011), the changing market for BAs (for example, Mason et al., 2019), or gender issues (for example, Amatucci, 2016; Alsos & Ljunggren, 2017; Becker-Blease & Sohl, 2007; Harrison & Mason, 2007). However, it should be noted that the themes are to some extent intertwined, with an elementary categorisation of business angels, also with respect to networks or groups of business angels, including the gender distribution of investors (Harrison et al., 2020). This statement is unsurprising, as the historical development of world economies has been accompanied by changes in markets not only for venture capital, as confirmed by the research of Mason et al. (2019), where in terms of the characteristics of business angels, there is a transition from the typical middle-aged male investor who operates individually to younger investors who come together in groups and subsequently invest venture capital informally in emerging and start-up businesses, where the coronavirus crisis has shifted the focus of BAs to incumbent and longer-established businesses that use external financial capital to fund additional rounds of operations. In addition, it is also possible to observe changes in sectoral characteristics, with an increase in BAs investing in the pharmaceutical industry during the pandemic (Mason & Botelho, 2021).

Who are business angels in terms of the socio-demographic profile of informal venture capital investors? What is their investment strategy? In what companies and what sector are BAs investing? Wetzel (1984) had already sought answers to these questions, and future studies replicated the research in an attempt to find answers to these questions on a global scale, not just in the United States. However, it should be noted that the majority of research on business angels is directed to this area, as it has the highest accumulation of venture capital ever, especially in Silicon Valley or Route 128 (Grilliet al., 2018; Pisoni & Onetti, 2018). On a global scale, the study by Wetzel (1984) was for example followed up by Wong and Ho (2007): Singapore, Li et al. (2013): China, Romaní et al. (2013): Chile. On a European scale, these include studies by Šarić and Krstičević (2018): Croatia, Reitan and Sorheim (2000): Norway, Mason and Botelho (2014): UK, Mason et al. (2019): Scotland, Lathi (2011): Finland, Stedler and Peters (2010): Germany and specifically for the Czech Republic, the characteristics of BAs were defined in particular by Zinecker et al. (2021a, 2021b) and Skalicka et al. (2022)

or World Bank Group (2018). With respect to the generation of research, it may be noted that the first, third, and essentially fourth generations of business angel research are intertwined in the identification of BAs' persona, as many authors only define elementary sociodemographic characteristics of BAs (Wetzel, 1984; Wong, Lee, Ho & Wong, 2005), some include psychological aspects (Block et al., 2019; Duxbury et al., 1996; Murnieks et al., 2015), specifically investor personality traits, or assess the difference in gender issues (Becker-Blease & Sohl, 2007; Harrison & Mason, 2007).

On a global scale, specifically on the American continent, the persona of a business angel is defined as follows: in North America, according to the Angel Capital Association (2019), 77.9% are white males aged about 48 years old, 55% of whom have previously established their own start-up, with 63% of BAs operating in the San Francisco, Boston or New York area. It is in these areas that the average investment is higher, specifically $32,432 versus the normal $25,000. This is not surprising, as it is the demographic demarcation of an investment which plays a significant role in its valuation, and it is the Silicon Valley and Route 128 region (Giot & Schwienbacher, 2007), and it is also where the fastest growth in the purchase of start-up or emerging companies continues to occur (Pisoni & Onetti, 2018). BAs typically invest in information and communication technology (ICT) businesses: 38%), health care: 25%, or in the consumer sector: 13 % (ACA, 2019). Furthermore, a study from Chile, for example, shows similar findings, while Romaní et al. (2017), based on a quantitative survey or questionnaire survey with 37 BAs and subsequent statistical processing in the form of univariate and bivariate descriptive analysis, concluded that business angels are 81.1% male, aged 45-65 years (70.2%) with a bachelor's degree or higher (51.4%), where 78.4% of them have business experience and the amount of invested funds is usually $20,000-30,000 (49.5%). For the Asian region, Wong et al. (2005), based on interviews and subsequent statistical analysis, characterised BAs in Singapore as generally male (57.1%), aged 37.5 years, with a bachelor's degree or higher (85.3%), holding a full-time or part-time job (76.6%), and with an average investment of $14,750. In this regard, China shows a relatively younger BAs, namely 30-40 years old (48.7%) with a bachelor's degree or higher (97.4%), according to Li et al. (2013), based on a questionnaire survey with 76 BAs and subsequent descriptive statistical evaluation of BAs, where this investor has experience in top management positions in 80.8% of the cases. In this case, men make up 76.6% of the total number of BAs. The average amount invested is similar to Singapore, Thailand and the Philippines (Li et al., 2013).

In the European context, specifically in Central and Eastern Europe, there are about 337,500 business angels, 70% of whom are men, whose investments are mainly in Fin Tech: 25 %, ICT: 21%, or healthcare: 16% and the average amount invested is €25,400 (Invest Europe, 2018). Mason and Botelho (2014) defined the business angel persona for the UK based on primary quantitative research in the form of an online questionnaire survey with 238 BAs, where the results showed that 88% of BAs are male, the majority are over the age of 45, 76% have a minimum of a Bachelor's Degree, most have experience in the financial sector (37%) and most also have experience in the SME business sector as a Chief Executive Officer (59%).

Similarly, Stedler and Peters (2010) used a questionnaire survey to collect data in order to descriptively analyse the primary data collected from 106 business angels in Germany. In this case, the business angel from a socio-demographic point of view is 95% male, aged 40-45 (47%) with his own business (55%), and operating in the western part of Germany (52%). These business angels have experience primarily in the mechanical and plant engineering services sector, where they are or have been heads of companies or members of top management (82%), and their surplus funds are invested mostly in the ICT sector: 52%, and at the life stage of the business: start-up (45%) or seed (38%), with BAs making an average of 3 investments. A questionnaire survey to descriptively process the primary data was also used by Reitan and Sorheim (2010), analysing a total of 425 BAs from Norway, in which 97% of the business angels are male with an average age of 47 years and an average net worth of $410,000. Norwegian BAs have extensive work experience in top management positions (46%) and a university degree. The list of the European context may be concluded with a Croatian study published by Šarić and Krstičević (2018), which states that BAs in Croatia are in 100% of cases men aged 55-64 (50%) with a university degree of at least the Bachelor's level (75%); BAs have experience in running their own business (100%); they have been investing for around 15 years (75%), and their average investment is in the order of HRK 100,000-250,000 (50%), have made on average 1-3 investments, and are primarily clustered around the city of Zagreb. The authors came to these conclusions based on the descriptive analysis of secondary data, specifically a questionnaire survey of four business angels (Šarić & Krstičević, 2018).

For the Czech Republic, the market for business angels was first defined in 2018 by the World Bank Group Study based on a descriptive analysis of primary and secondary data obtained from databases such as Invest Europe or from interviews with BAs market stakeholders. As for business angels, the study only presents general conclusions and rather characterises the business angel market in the Czech Republic, specifically stating that the market of BAs in the Czech Republic is developing with high growth potential, but it is small both in terms of the number of investors and the amounts invested. There are few business angels in the Czech Republic, they operate in a covert manner, are high net worth individuals, and invest mainly in start-ups with the condition of a well-defined product and customer (World Bank Group, 2018), which may pose a problem for the potential demand side of the BAs market, as Bortlová's (2015) research findings indicate that the business plans of recipients of financial capital are usually vague and incomplete. In this respect, the conclusions of the research by Zinecker et al. (2021a, 2021b), who defined specific sociodemographic characteristics of business angels in the Czech Republic based on the descriptive analysis of primary qualitative research data, namely in the form of 31 face-to-face semi-structured interviews with Czech business angels in the period 2018-2019, may be deemed crucial. The authors' results indicate that these are men (97%) with an average age of 51 years and 3-5 years of investment experience. Investors have a high level of senior management experience in companies where they are owners or employees, namely in the areas of sales, marketing, or finance. In the over group aged over 60

years, these are generally "full-time" investors. Among investors aged 40-50 years, it is possible to identify operations managers with experience in the ICT sector. The larger the portion of the investor's portfolio that the investment occupies, the higher the investor's active involvement in the company. As for the education of BAs in the Czech Republic, two-thirds have a university degree, plus about a third have other management education courses such as an MBA. Only 6% of BAs in the Czech Republic have successfully completed their doctoral studies (Zinecker et al., 2021a).

From the list of global and European studies on the characteristics of business angels, it is evident that the characteristics of BAs can be divided into three areas (Šarić & Krstičević, 2018): (1) Socio-demographic data – gender, age, education, wealth, portfolio size, experience, and professional background (Li et al., 2014; Mason & Botelho, 2014; Stedler & Peters, 2003; Reitan & Sorheim, 2000; Šarić & Krstičević, 2018; Wong & Ho, 2007; Zinecker et al, 2021a, 2021b); (2) the profile of investments – size, frequency, investment period, co-investors, location, phase of the business life cycle, exit or sector of business (Lathi, 2011; Li et al, 2014; Reitan & Sorheim, 2000; Mason & Botelho , 2014; Wong & Ho, 2007); (3) motivation – the added value of BAs, the personality profile of the investor, non-financial criteria of angel behaviour or the causes of the business angel behaviour in accepting or rejecting the project (Li et al., 2014; Stedler & Peters, 2003; Skalicka et al., 2022). However, the conclusions of the second area are absent for the Czech Republic, i.e., the profile of realised investments within investment location, deal date, deal type, deal size, co-investors, company stage, industry, and industry group. Furthermore, there is a complete lack of triangulation of research validity, in the form of data, methodological and triangulation of researchers (Denzin, 1978), and finally, in the context of the Czech Republic, there are no conclusions of a multidimensional statistical analysis of primary or secondary data with the aim of defining the person of a business angel in the Czech Republic.

3. METHODOLOGY

The research of this paper is based on a quantitative approach and descriptive and statistical analysis of secondary data of nearly eighty (N = 78) Czech business angels defined on the basis of realised investment opportunities, which were obtained from the private database Pitchbook. The collected data have been cleaned, coded, identified, and finally interpreted (Hendl, 2005), using Microsoft Excel software for data cleaning and coding. Subsequently, the adjusted data are transferred to IBM SPSS Statistics 28 software for identification and interpretation, where they are subjected to descriptive and statistical analysis in the form of relative and absolute frequencies, contingency tables, or cluster analysis. In the global, but also in the Czech context, the research is unique, as secondary data from the Pitchbook database in association with business angels are used very sporadically, and if the data from this database are analysed, business angels are usually included as part of the venture capital market as a whole (e.g. Brush, Green, Balachandra & Davis, 2018; Harrison & Mason, 2019; Kenney & Zysman, 2019).

In addition, for the Czech Republic, it may be concluded on the basis of our own findings that the scientific community has not yet analysed Czech business angels on the basis of secondary data from the private Pitchbook database. It is necessary to mention that the triangulation method is used to fulfill the goal set in the introduction. It involves data triangulation using secondary data from the Pitchbook database, quantitative research, and subsequent evaluation with the help of descriptive statistical analysis. In addition, with the help of multidimensional statistical methods, namely cluster analysis, which will provide profiles of business angels in the Czech Republic. In the framework of triangulation, it is also the triangulation of researchers (Hendl, 2005).

The research sample was selected at the end of December 2021 from a pool of all venture capitalists recorded in the Pitchbook database. The sample population then consisted of business angels based in the Czech Republic, specifically filtering the investor according to the following parameters: investor = business angels individual, country/headquarters = Czech Republic, nationality = Czech. On the basis of these search parameters, nearly a hundred business angels were found according to the realised investment opportunities. These data were transformed into Microsoft Excel software, where data cleaning and coding were performed based on the generally applicable data management methodology of Handel (2005), firstly removing BAs of foreign nationalities that the database included in the sample, then eliminating business angels whose investment profile did not show complete socio-demographic and investment data, and finally adjusting the size of the research sample according to the total number of investment opportunities realised by the business angel. Since the secondary data were qualitative, or nominal and categorical (e.g. the registered address or field of education) and quantitative, or cardinal (e.g. age or volume of investments), the categorical variables were coded by assigning a specific code to each attribute; in addition, the variable of age was categorised according to the distribution methodology of Zinecker et al. (2021a), for the sake of future comparison in the discussion of this paper. After editing, cleaning and transforming the data, the final sample comprised exactly seventy-eight Czech business angels (N = 78). This is a significant number for descriptive and statistical analysis and the Czech Republic region, as all authors of this phenomenon agree that covering a representative sample of business angels is almost a superhuman feat. The reason is that business angels around the world invest anonymously or covertly (Mason & Botelho, 2014; Stedler & Peters, 2003; Prowse, 1998; World Bank Group, 2018), with the main aim of protecting their own investment strategy (Lathi, 2011).

The analysis of the research sample includes two of the three areas of business angel characteristics summarised and defined by Šarić and Krstičević (2018). Specifically, parameters to the area of socio-demographics and the profile of investment intentions made were found in December 2021, which is not surprising, as the third area within the characteristics of business angels consists in the motivation for their behavior and actions, for which qualitative investigation in the form of primary data collection, for example using interviews, is deemed

necessary (e.g. Zinecker et al., 2021a, 2021b; Skalicka et al., 2022). The individual parameters included in this research from the Pitchbook database include the following: (1) Socio-demographic data – gender, age, highest completed education, field of education, managerial education, whether the investor operates only as a BA or has other business activities, and registered address; (2) investment profile – investment location (country and city), date of investment, deal type, deal size, co-investors, company stage, industry, and industry group. In this respect, it is useful to specify the different life stages of the business, or the deal type category, based on the results of the Pitchbook database from which the data was taken. Specifically, this database identifies seed companies as start-ups, whereas they may often lack the identification of a final product or legal form of the company; not infrequently when BAs invest in an idea. While a start-up is already an emerging company and the usual funding consists in Series A-B. The list of phases concludes with later-stage ventures, where later rounds of funding occur, typically Series B–Z+ (Pitchbook, 2021).

For the purposes of evaluating the data, first of all, descriptive statistical analysis and expression of absolute or relative frequencies of the examined samples is used, including contingency tables. The IBM SPSS Statistics 28 software is used, both in terms of socio-demographic categorisation and in terms of the investment profile of business angels. As such, descriptive statistics is a basic data evaluation technique used to organise and summarise data (Holcomb, 2016), with frequencies representing specific response options. In the case of absolute frequencies, it is the sum of the response variations, and the relative frequency expresses the ratio of absolute frequencies to the size of the research population (Kozel, 2006; Walker, 2013). For example, the approaches of Li et al. (2013), Skalicka et al. (2022), Stedler and Peters (2010), and Zinecker et al. (2021a, 2021b) are used in this paper to categorise the frequencies, and it is the publications of the latter authors that play an important role in the subsequent discussion and comparison of results based on a qualitative versus a quantitative approach.

Finally, the data are analysed in the IBM SPSS Statistics 28 software, using multivariate statistical investigation or two-step cluster analysis, which is used in scientific publications by authors such as Lathi (2011), Mohamed and Awang (2015), Hellmann and Thiele (2015). The reason for using the two-step cluster analysis in the research of this paper is that it is possible to analyse higher tens to tens of thousands of data within this method, and moreover to combine nominal, ordinal and cardinal data. This fact is also confirmed by Norusis (2006) or Schmidt and Hollensen (2006), on the basis of which the logarithm is distinguished from, for example, hierarchical clustering. The two-step cluster analysis is one of the more modern algorithms for clustering data based on their similarities, which this method identifies automatically, and as the name implies, it uses two steps to analyse the data. Firstly, it is the creation of pre-clusters using random partitioning into groups, which are usually in the order of dozens, and secondly, the clustering of pre-clusters using an agglomerative approach (Rabušic, Soukup & Mareš, 2019). The reason for the use of the two-step cluster analysis in the research of this paper is that it is possible to combine nominal, ordinal and

cardinal data within a two-step cluster, which is also confirmed by Norusis (2006) and Schmidt and Hollensen (2006).

According to Mohamed and Awang (2015), the two-step cluster analysis consists of several processes, namely (1) Auto Clustering Statistics (Schwarz's Bayesian Criterion/BIC), (2) Distance Measure (Log-likelihood Criterion), (3) Pearson's Chi-squared Test, and (4) T-test. (1) In the initial part of the algorithm, BIC determines the appropriate number of clusters of the dataset based on the formula (Ernst & Kellis, 2012; Konishi & Kitawawa, 2008):

$$\text{BIC} = -2\log f(\hat{L}) + p\log N \tag{1}$$

Where $\hat{L}$ = maximised value of the log-likelihood function; log = logarithm of the function; N = sample size; p = sum of model-estimated parameters, with lower resulting BIC values indicating better quality associations in the model, meaning that the lower the BIC, the better the categorisation of the resulting clusters. Following BIC, the two-step cluster algorithm works with (2) Distance Measure (Log-Likelihood Criterion/$\hat{L}$), i.e. measuring the distance between categorical and cardinal variables, assuming that these variables are independent of each other. The distance measure itself is based on the multiplication and individual probability density function of the model attributes = f (y), and the formula looks as follows (Noruris, 2006; Edge, 2021):

$$\hat{L} = \prod_{n=1}^{N} f\ (y_n | y_{n-1}, y_{n-2}, \dots, y_1, \theta_1, \theta_2, \dots, \theta_k) \tag{2}$$

In this case, the lower the number, the smaller the distance between clusters and vice versa (Noruris, 2006). Next, it uses Pearson's Chi-square Test (x^2) algorithm, or testing for independence and goodness of fit. The independence test checks whether two or more observations in two or more categories are dependent on one another. The goodness-of-fit test then evaluates whether the observed frequency distribution matches the theoretical or expected one (Mohamed & Awang, 2015). Testing is based on chi-square statistics and comparison of observed, or empirical, and expected frequencies (Rabušic et al., 2019). In both cases, this is conducted on the basis of the following formula (Mohamed & Awang, 2015):

$$x^2 = \sum \frac{(O-E)^2}{E} \tag{3}$$

Where O = number of observations of one type; E = number of expected observations of one type (Pearson, 1990). The last step in the two-step cluster algorithm consists in the (4) Independent T-test (t), which evaluates the differences between two independent or unrelated groups by comparing two means originating from the sample. The test results provide information on whether two independent groups differ from one another. The sample variance (s_1; s_2), the sample mean ($\overline{x_1}$; $\overline{x_2}$), and the sum of observations (n_1; n_2) in the selected group enter the formula (Angel, 1985; Hahs-Vaughn and Lomax, 2020), specifically the Independent T-test may be calculated as follows (Mohamed & Awang, 2015; Noruris, 2006; Rabušic et al., 2019):

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}} \quad (4)$$

The resulting clusters of the two-step cluster analysis are named according to the most significant criteria for cluster distribution, whose values are close to 100%, based on already conducted studies that create or analyse typologies of investors or companies (e.g. Birch & Medoff, 1994; Cristofaro, Kask & Muldoon, 2022; Croce, Ughetto, Bonini & Capizzi, 2021; Ganesh, 2016), etc. For instance, Ganesh (2016) BAs classified business angels in this manner into the corporate angel, entrepreneurial angel, enthusiast angel, micromanagement angel, or professional angel.

4. RESULTS

4.1. Socio-demographic profile

In the area of socio-demographic data, or rather the identification of the socio-demographic profile of Czech business angels, it may be stated, that the supply side of the Czech business angel market is made up of 96% male investors. However, it is important to note that by the nature of the business angel's operation, who generally operates anonymously and is not recorded in any databases (Prowse, 1998; World Bank Group, 2018), the gender distribution results may differ slightly. In terms of the total number of Czech business angels, the 41-50 age category is the most commonly represented (Table 1). The typical age of a BA is 48 years. In this case, it is interesting that in relation to the gender distribution, the age of all women falls into this category. The category of 31-40 years takes up the second place in the total number. It can be expected that such an age structure is favourable as it might help foster the development of the start-up scene and thus the growth of the Czech economy.

Table 1

Age Structures of Business Angels in the Czech Republic

Age Categories (years)	Up to 30	31–40	41–50	51–60	Over 61
n	1	17	42	15	3
% of n	1.3	21.8	53.8	19.2	3.8

Source: Own elaboration from Pitchbook

The highest level of education attained by Czech business angels is a master's degree (Table 2), with Economics being the most common field of education, followed by ICT and Engineering. The highest number of business angels from the field of Economics or ICT falls within the age category of 41-50 years, in contrast to Engineering, where the vast majority are in the category of 51-60 years (Table 3). This is not surprising in view of the gradual development of education in the Czech Republic, the trend of which shifts towards ICT rather than Engineering. Business angels have rarely completed their MBA or equivalent management degree but when a management degree is obtained, it is in all cases

for persons whose highest level of education is a master's degree. Czech business angels operate in the area of large cities, mainly in Prague. Furthermore, in Brno, Kladno and Ostrava city (Table 4). The very location of Czech business angels is not surprising, as this type of investors is clustered around large cities, where there is the potential for the creation of a suitable start-up.

Table 2

Educational Background of Business Angels

Level of Education	Basic	High School	Bachelor	Master	Ph. D.	Associate Proffesor
N	1	9	1	57	9	1
% of n	1.3	11.5	1.3	73.1	11.5	1.3

Source: Own elaboration from Pitchbook

Table 3

Specialization of Education According to Age Categories

Age Categories (years)	Specialization of Education					
	Economy		ICT		Engineering	
	n	*% of n*	*n*	*% of n*	*n*	*% of n*
Up to 30	0	0.0	1	4.3	0	0.0
31–40	10	27.0	4	17.4	0	0.0
41–50	20	54.1	16	69.6	1	14.3
51–60	4	10.8	2	8.7	6	85.7
Over 61	3	8.1	0	0.0	0	0.0
Total	37	100.0	23	100.0	7	100.0

Source: Own elaboration from Pitchbook

Table 4

Office of Czech Business Angels

Office of Czech BAs	Prague	Brno	Kladno	Ostrava	Total
n	56	15	4	3	78
% of n	71.8	19.2	5.1	3.8	100.0

Source: Own elaboration from Pitchbook

Czech business angels are divided into two groups according to their work activities. The first group, in addition to angel investing, also engages in other work activities and includes about three quarters of informal venture capital investors. The remaining one quarter, or the second group, there are angel investors only. There are certain nuances identified between these groups, primarily the age or location of the informal venture capital investor. If they are only acting as business angels, most of them are classified in the age category of 41-50 years (Table 5) or older. The difference within the BAs focusing only on angel investing was also identified in the case of the investor's location, as the vast majority of these angels are concentrated in Brno. Furthermore, angel investors only operate in Prague, Ostrava, and Kladno (Table 6). In this case, there is an obvious difference in the

ranking of the cities compared to the total number of Czech BAs without differential the area of work activities.

Table 5

Angel Investor Only According to Age Categories

Age Categories (years)	Angel Investor Only					
	Yes		No		Total	
	n	*% of n*	*n*	*% of n*	*n*	*% of N*
Up to 30	1	1.8	0	0.0	1	1.3
31–40	13	22.8	4	19.0	17	21.8
41–50	28	49.1	14	66.7	42	53.8
51–60	12	21.1	3	14.3	15	19.2
Over 61	3	5.3	0	0.	3	3.8
Total	57	100.0	21	100.0	78	100.0

Source: Own elaboration from Pitchbook

Table 6

Office of Business Angels According to Agel Investor Only

Angel Investor Only	Office of Business Angel									
	Brno		Prague		Ostrava		Kladno		Total	
	n	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of N*
Yes	10	66.7	6	10.7	3	100.0	2	50.0	21	26.9
No	5	33.3	50	89.3	0	0.0	2	50.0	57	73.1
Total	15	100.0	56	100.0	3	100.0	4	100.0	78	100.0

Source: Own elaboration from Pitchbook

4.2. Investment profiles

In terms of investment profiles of Czech business angels, the results show that BAs prefer to invest in the seed and start-up phase of the life cycle, with a slight predominance of investments in start-ups. However, Czech business angels also finance later stage ventures (Table 7). The distribution is not surprising, as in the later venture stage, the company needs larger amount of funds for its development, which are usually not provided by business angels. In this case, venture capital funds enter the enterprise. What is interesting in this case is the deal type in relation to the age categories. In general, it may be concluded that the older investor more likely invests in seed. Investors aged 61 years or more invest more often in seeds (Table 8). At least $0.03 million and at most $4.40 million were invested by Czech business angels in the individual companies, with a median of $0.98 million. The majority of investments may be classified in the range of $0.03–1.09 million, while as the invested amount increases, the number of completed investments decreases (Table 9).

Table 7

Type of Business Angel Investments in the Czech Republic

Deal Type	Seed	Start-up	Later-stage VC	Total
n	34	36	8	78
% of n	43.6	46.2	10.3	100.0

Source: Own elaboration from Pitchbook

Table 8

Deal Type According to Age Categories

Deal Type	Age Categories (years)									
	Up to 30		31–40		41–50		51–60		Over 61	
	n	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of n*
Seed	0	0.0	8	47.1	17	40.5	7	46.7	2	66.7
Start-up	1	100.0	8	47.1	19	45.2	7	46.7	1	33.3
Later-stage	0	0.0	1	5.9	6	14.3	1	6.6	0	0.0
Total	1	100.0	17	100.0	42	100.0	15	100.0	3	100.0

Source: Own elaboration from Pitchbook

Table 9

Deal Size of Czech Business Angels

Deal Size (million)	$0.03–1.09	$1.10–2.09	$2.10–3.09	$3.10–4.40
n	65	7	4	3
% of n	83.3	7.7	5.2	3.8

Source: Own elaboration from Pitchbook

In terms of categorisation of Industry, the ICT sector accounts for the largest share, followed by B2C, as well as Healthcare or B2B (Table 10). In the ICT sector, these are usually Entertainment Software, Business Software and Application Software, in the B2C sector, Czech business angels invest mainly in Information Services, while within Healthcare, in Other Healthcare Services, and finally in B2B, in Media and Information Services. In relation to the business life cycle phase, ICT investments are directed in almost identical proportions to seeds and start-ups, as well as in the case of the B2C and B2B sectors. The exception consists in the Healthcare sector, where the majority of investments takes places in later-stage ventures (Table 11). In addition, investors who act only as business angels invest twice as much in the B2C sector compared to BAs who have other business activities, which can be explained by the nature of the B2C sector itself, which is more time consuming compared to other sectors, as accurate identification of the customer, their buying behaviour and thus marketing communications play an important role.

Table 10

Angel Investment by Industry

Industry	ICT	B2C	Healthcare	B2B	Total
n	45	18	8	7	78
% of n	57.7	23.1	10.2	9.0	100.0

Source: Own elaboration from Pitchbook

Table 11

Angel Investment by Industry and Life Cycle Stage

Deal Type	Industry									
	ICT		B2C		Healthcare		B2B		Total	
	n	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of n*	*n*	*% of N*
Seed	21	46.7	10	55.6	0	0.0	3	42.9	34	43.6
Start-up	23	51.1	8	44.4	1	12.5	4	57.1	36	46.2
Later-stage	1	2.2	0	0.0	7	87.5	0	0.0	8	10.2
Total	45	100.0	18	100.0	8	100.0	7	100.0	78	100.0

Source: Own elaboration from Pitchbook

In relation to the location of a specific investment, BAs prefer the Czech Republic, usually Prague; however, their money is also directed in a minority to Brno or Ostrava. Outside the Czech Republic, investment in new or start-up companies also takes place in the United States of America, particularly in San Francisco and Boston. In the Czech Republic, there is still a trend to invest in companies where the investor can physically arrive within an hour or two, for these reasons Czech BAs based in Prague invest in companies in Prague and BAs based in Brno invest in Brno companies, and these are primarily companies in the ICT sector (Table 12). Of course, again in the wake of digitisation, the border is beginning to blur, but compared to the United States, for example, the market of business angels in the Czech Republic is not yet as mature.

Table 12

Industry According to Location of Investments

Industry	Location of Investments					
	Prague		Brno		Ostrava	
	n	*% of n*	*n*	*% of n*	*n*	*% of n*
ICT	35	54.7	6	85.7	0	0.0
B2C	15	23.4	0	0.0	2	100.0
Healthcare	8	12.5	0	0.0	0	0.0
B2B	6	9.4	1	14.3	0	0.0
Total	64	100.0	7	100.0	2	100.0

Source: Own elaboration from Pitchbook

At the end of the investment profiles section, it is appropriate to mention the size of the investment portfolio of Czech business angels. An angel investor holds 1–6 investments in their active investment portfolio, and more than half of the investors have just one or two active investments (Table 13). This result is based on the increasing interest in the informal venture capital market in the Czech

Republic, when starting business angels complete a lower number of business transactions. On the other hand, six active investments also have a significant presence in the portfolio, which can be associated with investors whose only job is angel investing.

Table 13

Investment Portfolio of Czech Business Angels

No. of Investments	1	2	3	4	6	Total
n	45	14	9	4	6	78
% of n	57.7	17.9	11.5	5.1	7.8	100.0

Source: Own elaboration from Pitchbook

4.3. Other statistical data processing

The descriptive statistical analysis of the research sample provides to some extent a sociodemographic profile of the Czech business angel's persona and the profile of their investment. However, the typical persona may not be only one, and it is for this expression that the Two-step Cluster method is applied. In the first phase, the number of clusters is defined using Schwarz's Bayesian Criterion (BIC). In this case, there are two clusters. Table 14 shows the calculations of the individual BICs, where it is obvious that the lowest value of BIC Change (i.e. 65.116) is in the second cluster; in addition, there is also the highest required value of Ratio of Distance Measures (1.544), which confirms the correct selection of the number of clusters, as well as the value of Cluster Quality of the Two-step model, which takes the value of 0.2, thus getting into the satisfactory values of the Two-Step Cluster model. The resulting percentage distribution of the total number of samples is equal to 34.6% for Cluster 1 and equal to 65.4% for Cluster 2 (Table 15), i.e. the Ratio of Sizes is at 1.89, in which case the closer the number is to one, the more appropriate the definition of the final number of clusters.

Table 14

Schwarz's Bayesian Criterion

Numbers of Clusters	BIC	BIC Change[a]	Ratio of BIC Changes[b]	Ratio of Distance Measures[c]
1	2319.682			
2	2384.798	65.116	1.000	1.544
3	2534.413	149.615	2.298	1.112
4	2699.631	165.218	2.537	1.191
5	2887.295	187.664	2.882	1.109
6	3086.518	199.223	3.059	1.155
7	3299.922	213.405	3.277	1.067
8	3519.090	219.168	3.366	1.358
9	3760.890	241.800	3.713	1.065
10	4006.534	245.643	3.772	1.043
11	4254.628	248.094	3.810	1.047
12	4505.275	250.647	3.849	1.044
13	4758.193	252.918	3.884	1.257
14	5021.766	263.573	4.048	1.161
15	5291.094	269.328	4.136	1.065

[a] The changes are from the previous number of clusters in the table.
[b] The ratios of changes are relative to the change for the two cluster solution.
[c] The ratios of distance measures are based on the current number of clusters against the previous number of clusters.

Source: Own elaboration from Pitchbook

Table 15

Two-Step Cluster Analysis – Number of Clusters and Distribution

Number of Cluster	Cluster Distribution		
	N	% of Combined	% of Total
1	27	34.6	34.6
2	51	65.4	65.4
Combined	78	100.0	100.0
Total	78		100.0

Source: Own elaboration from Pitchbook

Verification of the correctness of the resulting clusters and statistically significant criteria for their categorisation is determined by Pearson Chi-Square and Independent T-test. The resulting values (Table 16) indicate that the main predictors of clustering included the criteria of the number of investments, office, active portfolio and pure BA, whose Predictor of Importance in the automatic clustering of the Two-Step Cluster Analysis is higher than 0.50, i.e. 50%. The calculated probability of first order Pearson Chi-Square error or Likelihood Ration correction for dichotomous variables is <0.001 for the particular criteria, which demonstrates the statistical significance and dependence of the criterion for the formation of Cluster 1 and Cluster 2. The same values of statistical significance (Sig.) are shown by the Independent T-test, where the significance level of Levene's Test for Equality of Variance (F) is equal to 0.18, hence the inclusion of the Equal Variance not Assumed column. The t sig. is <0.001 for the number of investments, office, active portfolio, and pure BA, which again confirms the statistical significance of the clustering criterion. It is obvious from the table that the level of significance for both tests is also below 0.05 in the case of the criterion of the location of investment – city and age, thus confirming the statistical significance. However, in relation to the Predictor of Importance, which is 0.23 or 0.13, the significance is substantially lower compared to the factors at the <0.001 significance level for both selected types of testing. For the remaining criteria, the dependence for the determination of the resulting clusters was not confirmed.

The results indicate that there is not only one typical persona of a business angel in the Czech Republic, but even two typical personas (Table 17). The first cluster, or the person of the investor, can be named as: Active "Brno citizen", while the second cluster as: Temperate "Prague citizen", with the selected labels explicitly corresponding to the Predictor of Importance values. Specific factors from the socio-demographic data values of the defined clusters are as follows: *Cluster 1:* Active "Brno citizen" – the business angel of this cluster is a middle-aged man, 48 years old, his highest level of education is a Master's Degree in Economics, and he does not hold any MBA-type management degrees.

Table 16

Significance Testing of Cluster criteria

Factor	Two-Step Cluster	Chi-Square (x^2)		Independent T-test (t)	
	Predictor Importance	x^2	Sig. (2-sided)	t	Sig. (2-sided)
Number of Investments	1.00	41.868	<0,001	6.047	<0,001
Office	0.86	46.520	<0,001	4.900	<0,001
Active Portfolio	0.77	32.528	<0,001	5.056	<0,001
Angel Investor Only	0.62	27.262	<0,001	-5.401	<0,001
Location* – City	0.23	21.193	0.003	1.727	0.045
Age	0.13	10.039	0.040	2.353	0.024
Industry Group	0.12	30.597	0.045	1.407	0.166
Company Stage	0.12	7.558	0.056	1.164	0.250
Location* – State	0.07	6.352	0.174	0.924	0.360
Industry	0.07	4.907	0.179	0.216	0.829
Gender	0.06	1.416	0.234	0.991	0.329
Specialization of Education	0.05	10.603	0.304	-0.275	0.784
Deal Type	0.04	1.961	0.375	-1.150	0.254
Deal Size	0.04	35.658	0.258	0.843	0.403
Co-investors	0.02	14.675	0.066	-0.509	0.613
Managerial Education	0.01	0.068	0.794	-0.249	0.804
Level of Education	0.01	1.985	0.851	-0.407	0.685

*of Investment

Source: Own elaboration from Pitchbook

The investor has completed a large number of investments, while his business is based in Brno. He has three investments in his active portfolio, and angel investing is already the only activity pursued by him. However, despite being headquartered in the South Moravian metropolis, his area of interest is in emerging and start-up companies around Prague, but locally in the Czech Republic, where he and two other BAs invest around one million dollars in life-cycle businesses called start-ups at the company stage of generating revenue. The target company operates in the ICT sector, specifically in the field of Application Software. *Cluster 2*: Temperate "Prague citizen" – the second type is again a middle-aged man, 47 years old, with the highest completed level of education in the form of the Master's Degree in Economics without having obtained any managerial degrees. The investor is based in Prague, where he also directs his business activities and investments, while angel investing is only one of the individual activities; outside BA, he also acts as a founder of his own company, i.e. he is also "on the other side". This is also explicitly associated with the number of investments, which is lower compared to the "Brno citizen" and specifically there is only one investment in the active portfolio, but this fact is logical, as providing smart money costs a greater amount of time, and the investor must also invest it in his business. The BA invests with three other business angels less than $1 million in start-ups in the company stage of generating revenue. Again, ICT serves as the sector of final investment, yet the field includes business software, which is not surprising as there is easy scalability, but also the internationalisation of the business, which are the core criteria of the BA in ICT when investing in start-ups and emerging businesses.

Table 17

Description of the Resulting Cluster Distribution

Factors	Cluster 1 Active "Brno citizen"			Cluster 2 Temperate "Prague citizen"		
	Description/Median	N	%	Description/Median	N	%
No. of Investments	3.30	-	-	1.22	-	-
Office	Brno	15	55.6	Prague	49	96.1
Active Portfolio	3.04		-	1.12	-	-
Angel Investor Only	Yes	17	63.0	No	47	92.2
Location* – City	Prague	16	59.3	Prague	48	94.1
Age	41–50	11	40.7	41–50	31	60.8
Industry Group	Application Softw.	5	18.5	Business Softw.	9	17.6
Company Stage	Revenue	21	77.8	Revenue	47	92.2
Location* – State	CZ	24	88.9	CZ	50	98.0
Industry	ICT	16	59.3	ICT	29	56.9
Gender	Male	25	92.6	Male	50	98.0
Specialization of Edu.	Economy	12	44.4	Economy	25	49.0
Deal Type	Start-up	13	48.1	Start-up	23	45.1
Deal Size	1.10	-	-	0.92	-	-
Co-investors	2.41	-	-	2.69	-	-
Managerial Education	No	25	92.6	No	48	94.1
Level of Education	Master	20	74.1	Master	37	72.5

* of Investment

Source: Own elaboration from Pitchbook

5. DISCUSSION

In the context of global research on informal venture capital and the first area of angel investor characterisation, i.e. within sociodemographic data, business angels are defined as middle-aged men investing a portion of their assets in high-risk business ventures (e.g. Li et al, 2014; Mason & Botelho, 2014; Stedler & Peters, 2003; Reitan & Sorheim, 2000; Šarić & Krstičević, 2018; Wong & Ho, 2007). This investor's characteristics correspond with the results presented in this paper: it can be concluded that business angels in the Czech Republic are 96% male with an average age of 47 years in the 41-50 age category. However, each country shows slightly different results in relation to the age or gender distribution of angel investors. In America, whether in North America or Chile, BAs are about 80% male with an average age of 48 years (ACA, 2019; Romaní et al., 2017), while in Asia, specifically Singapore, the male representation is 57% with an average age of 38 years. However, these results are exceptional, as in China, male BAs are again more numerous (about 77%. On the other hand, the average age in this case is in the category of 30-40 years (Li et al., 2013; Wong et al., 2005), which is generally indicative of a higher proportion of women and also a younger population of business angels in Asia. In Europe, the male representation of BAs ranges from 88% for the UK to 100% in Croatia; moreover, the age category of investors is also higher, averaging 47 years (Mason & Botelho, 2014; Reitan & Sorheim, 2000;

Šarić & Krstičević). Despite the fact that the research trend of gender distribution is increasing (White & Dumay, 2017), it is still men who make the offer in the informal venture capital market.

Following the comparison of sociodemographic data by Zinecker et al. (2021a, 2021b), whose findings define (in 97% of the cases) Czech angel investors as men with an average age of 51 years, it may be concluded that there is, firstly, an increase in the share of women on the supply side of informal venture capital, a trend already identified by May and Liu (2015). Secondly, BAs in the Czech Republic are becoming younger, which is also evidenced by the second most represented age category of 31-40 years. In this case again, there is an obvious difference from the conclusions of Zinecker et al. (2021a, 2021b), who list 40-50 years and over 60 years as the second most common age category. This trend may be explained by the fact that it is the younger individuals who form groups and subsequently informally invest in newly established or start-up businesses (Mason et al., 2019), hence it is easier to start a business angel, as lower amounts of money are required in this regard. In addition, business angels in the Czech Republic are concentrated around large cities, where there are many opportunities in the form of start-ups and newly established businesses. This trend is not unusual, as business angels in the United States and worldwide operate in the same manner (ACA, 2019) because the number of angel investors also grows with the development of the informal venture capital market, and there are more investment opportunities around big cities (Giot & Schwienbacher, 2007; Pisoni & Onetti, 2018).

Another factor on which the scientific community agrees consists in the education of business angels, with results showing that the education of business angels is at least at the bachelor's degree level in more than 75% of cases (e.g. Li et al., 2013; Mason and Botelho, 2014; Reitan and Sorheim, 2000; Šarić and Krstičević, 2018; Wong et al., 2005). In this respect, the Czech Republic has an above-average representation of the higher education category compared to other European countries. For example, in Croatia or the UK, about 75% of BAs are university educated, which is consistent with the findings of Zinecker et al. (2021a, 2021b), who report that 74.2% of BAs in the Czech Republic have a university degree, including a Ph.D. The specific results of this paper for the Czech Republic (87.2%) may be compared with Asian countries showing the highest levels of education of business angels, namely 85.3% or 97.4% (Li et al., 2013; Wong et al., 2005). In contrast to Zinecker et al. (2021a, 2021b), the results of this paper report 13% higher university education on a younger sample of business angels, which could be generalised to imply that younger cohorts in the Czech Republic are more educated, which is explicitly related to easier access to university education in the Czech Republic. On the other hand, Zinecker et al. (2021a, 2021b) report a much higher representation of business angels with managerial education, such as MBAs, but the large difference may stem from the form of data collection, where qualitative research and primary data may capture a much larger number of these cases compared to the Pitchbook database.

In relation to the investment profile of business angels, it can be noted that they invest in emerging or start-up companies (Mason & Harrison, 1996; Pisoni & Onetti, 2018). In the Czech Republic, according to the results of this paper, the ratio of the above stages of the business life cycle is almost identical (seed: 43.6%; start-up: 46.2 %), which is similar to Germany, where business angels invest slightly more in start-ups (seed: 38%; start-up: 45 %). The higher representation of seeds can be explained by the support of the ecosystem of business angels and founders, with a number of seed accelerators or seed starters. The amount of financial capital invested by business angels in the Czech Republic according to the findings of this paper may be compared to similar amounts invested by BAs in Croatia, where Šarić and Krstičević (2018) report that the average amount invested is HRK 100,000-250.000. However, these results are misleading, as large numbers primarily resonate, small investments in the order of less than one million CZK are usually not recorded anywhere, as the population operates in a virtually hidden and anonymous manner (Prowse, 1998; World Bank Group, 2018). This result implies that it is very difficult to capture the amounts invested at all. What is significantly more likely in this regard are the average amounts reported by, for example, ACA (2019) for North America in the order of $25,000, as well as Romaní et al. (2017): $20,000-30,000 or Wong et al. (2005): $14,750 for China or Invest Europe (2018): €25,400 for Europe as a whole.

This financial capital is invested on a European scale according to Invest Europe (2018) in Fin-Tech: 25 %, ICT: 21%, or healthcare: 16 %. Similar results are reported in a survey by the Angel Capital Association, which concluded that 38% of all investment by BAs in North America flows into information and communications technology, 25% into healthcare, and 13% into the consumer sector (ACA, 2019). In this respect, the results of this article diverge, as the ICT sector is represented almost equally in the Czech Republic and in Germany, accounting for 57.7% and 52% respectively of the total number of all invested sectors (Stedler & Peters, 2010). The representation of the ICT sector in particular is influenced by the ease of scalability of the resulting products, which is explicitly generally associated with lower costs of product expansion in relation to the increase in demand for the company's products, compared to hardware start-ups, for example (Cavallo et al., 2019). In addition, it is a well-known fact that the field of information and communication technologies brings higher financial rewards, regardless of the fact, whether it is a founder or an investor. This fact then plays a role in choosing an investment and creating an investment portfolio. On the other hand, the ICT market may be oversaturated, thus creating potential for angel investors to move into other sectors.

It is an indisputable fact that angel investors in each country are united by a few factors within their socio-demographic or investment profile. On the other hand, there are factors differentiating them regardless of the description of the typology of business angels or the basic biological division, i.e. gender specification (Ganesh, 2016; Harrison & Mason, 2007, White & Dumay, 2017), although the studies were conducted in all countries of the world show that the typical angel investor is a middle-aged man (Stedler & Peters, 2010; Wetzel, 1983;

Zincker et al., 2021a, 2021b). From a general point of view, it is necessary to perceive that the typical person of a business angel based on real data does not have to be only one, which was also confirmed by the research of this article. In essence, the nuances (number of completed investments, location of the investor, active portfolio, angel investor only) of Czech angel investors cannot be further compared with the results of the academic community, since research in the world (e.g. Li et al., 2013: China; Romaní et al., 2013: Chile; Wong & Ho, 2007: Singapore), or the European environment (e.g. Lathi, 2011: Finland; Mason & Botelho, 2014: Great Britain; Mason et al., 2019: Scotland; Šarić and Krstičević, 2018: Croatia; Zinecker et al., 2021a: Czech Republic) describes only one most frequently person within individual countries. In this regard, it is appropriate to identify possible nuances of typical angel investors of individual countries in the world context, to which the behaviour of business angels, start-ups and policy makers can then be adapted with the aim of maximizing the effectiveness of the functioning of the informal venture capital market.

Although the essence of angel investors is to provide businesses, or founders, with their own know-how in addition to financial resources (Politis, 2008; Sohl, 1999) and they mostly invest from the heart and in people, the results show that it is a business like any other. This statement follows from the investment strategy of business angels, where the primary sector invested is ICT. The reason is the high level of scalability of the company, or its expansion to the international level (Cavallo et al., 2019). In this context, a change in investment behavior can also be observed as a result of the coronavirus crisis, when there was an increase in the interest of angel investors in the Healthcare sector, as a number of companies began to focus their business model towards vaccines and COVID-19 drugs with the vision of a higher rate of profitability of the project (Mason & Botelho, 2021). It is obvious that the implementation of the investment strategy is operatively adapted to the conditions of the external environment.

The resulting portfolio of business angels is ultimately influenced by the fact whether it is business angels only or not. The portfolio consists, first of all, of projects that have a deeper meaning for the investor, as they have, for example, a societal impact. In this case, it may also be about products whose production is more materially and mechanically demanding. Secondly, from projects where they expect a higher rate of investment appreciation, i.e. start-up projects from the information and communication technology sector, which finance projects that have a deeper meaning for investor. This is also related to the continuing global trend of the demographic scope of angel investors, i.e. performing investments close to the scope of BAs and large cities, where there is an accumulation of both venture capital and start-up companies (Grilliet al, 2018; Pisoni & Onetti, 2018). In general, it can be stated that there are cities where BAs are more active compared to other locations, in terms of active investment portfolio. On the other hand, due to globalisation and digitalisation, which has been affected by the coronavirus crisis, the place of residence of the investor and founder is becoming an ever less important attribute of investing (Mason & Botelho, 2021).

The behaviour of angel investors results in a number of possible recommendations for policy makers, as knowing a typical angel investor leads to the correct setting of support for regional and foreign investors. If the policy is to be successful in incentives, it must know to whom those incentives are intended. In the case of the Czech Republic, there is first of all a problem with the collection of data from a wider circle of angel investors. For this reason, the policy should aim, for example, at supporting networks of BAs that will ensure the collection of relevant data. These will then help map the needs of market participants and prepare policy measures. The conclusions of research by the World Bank Group (2018) or Zinecker et al. (2021b) agree with this statement, where the authors further provide rather general recommendations in the form of tax incentives, the systematization of legal regulations in the field of start-up business (Zinecker et al., 2021b), or the education of investors and founders (World Bank Group, 2018). In relation to the socio-demographic and investment profile of the angel investor in the Czech Republic, targeted assistance should be focused on the creation of a start-up ecosystem and the creation of networks in the vicinity of large cities, including accelerators focusing on the life cycle of a business in the seed phase. In addition, it should be aimed at raising awareness on the informal venture capital market in universities, the support of women investors and sectors outside information and communication technology, since as stated by the World Bank Group (2018), all sectors in the economy in the start-up project market have a high growth potential. Finally, policy makers must not neglect the nuances of typical personas of angel investors and variants of incentives to target identified investors.

The importance of the results for companies seeking venture capital cannot be overlooked, as founders are able to determine where and whom to look for their investment plan based on the identification of a typical persona of an angel investor. In the same manner, an angel investor can change their investment strategy with regard to the oversaturation of angel investors in the vicinity of large cities or specific sectors. The conclusions of studies carried out in the Czech Republic agree with this statement, while it may be stated that knowledge and education are key for the effective functioning of the market (e.g. Zinecker et al. 2021a, 2021b; World Bank Group, 2018).

6. CONCLUSION

The aim of the paper was to expand the current state of scientific knowledge at the level of the socio-demographic and investment profile of the business angel and within the definition of typical person of the angel investor in the Czech Republic. To the best of my knowledge, this article is the first ever to use secondary data from the Pitchbook database as a data basis in the analysis of the socio-demographic and investment profile of angel investors in the Czech Republic. Other research from this environment was survey-based, i.e. based on qualitative research and data collection. Furthermore, the research was the very first to use multidimensional statistical analysis to evaluate the data obtained, on

the basis of which the typical personas of an angel investor were defined. I believe that the goals have been met and the results of this research will have an impact not only on informal venture capital investors, but also on enterprises receiving venture capital and policy makers.

In order to expand the current state of knowledge, a quantitative survey and secondary data from the Pitchbook database were used, with the final sample consisting of nearly eighty Czech business angels defined on the basis of realised investment opportunities. The obtained data were analysed using the IBM SPSS software with the help of descriptive analysis, specifically, the expression of absolute or relative frequencies of the examined samples was used, including contingency tables. Statistical or multivariate Two-Step Cluster analysis was also used. The results indicate that business angels in the Czech Republic are becoming younger. In addition, an increasing trend in the level of education in economy was also identified. Business angels are mainly men, and they gather around big cities; they usually invest amounts of up to one million US dollars, specifically in the start phase of the life cycle of a company in the information and communication technology sector. The most common ones have one to three venture capital investments in their portfolio.

The typical persona of an angel investor in the Czech Republic according to the basic characteristics of the investor is twofold, where the key factors for the division into individual clusters are the number of investments, the investor's seat, the active portfolio and the fact whether he acts only as a business angel or not. The first investor can be called Active “Brno citizen”, as he has a higher number of angel investments, he is a middle-aged man with a Master’s Degree in Economics, and based in Brno, and angel investing is the only activity pursued. He invests in start-ups in the ICT sector in the field of Application Software. The second cluster, the Temperate “Prague citizen” is middle-aged man with a Master’s Degree in Economics is in his activity somewhat more moderate and he is based is Prague, where he also invests in start-ups in the ICT sector, specifically the Business Software. Compared to the first persona, the number of investments and the active portfolio is smaller, as angel investing is not the only activity he pursues.

Identifying typical angel investors is central to setting up the entire ecosystem or market of business angels. For the demand side, it is obvious that it is advisable to focus on the large city area to attract investment, where there is a higher concentration of business angels. In addition, business angel groups and networks are emerging in these areas, where formal or informal collaboration of business angels is explicitly related to selecting a better investment and reducing the risk, hence it is appropriate that the supply side of informal venture capital also chooses to expand its network of contacts in a particular area. The results play an important role for the government policymakers of the Czech Republic. It is necessary to provide targeted support especially at the regional level. Furthermore, the possibility of becoming and operating as business angels in the long term should be facilitated in the form of preferential tax packages or organised educational

support for investors and, ultimately, support should be provided to sectors outside information and communication technologies.

Finally, it is necessary to mention the limitations of this research, which arise mainly from the already mentioned fact that business angels operate covertly, anonymously and as a whole are not listed in any databases which would provide a comprehensive and representative sample of the population. In this respect, the choice of the Pitchbook database is limiting, as a relatively large sample of data was collected. On the other hand, the database covers only part of the market, part of the market will always remain anonymous, which may significantly distort the results. Following this, it is possible to recommend further secondary data collection in different datebases and primary data collection on the characteristics of business angels over a longer time horizon for future research, as this paper also shows that considerable transformation has taken place in several areas compared to the primary and secondary data. However, in this regard, a coordinated data collection activity is necessary in order to capture the real functioning of the market of business angels in the Czech Republic by the state.

What the scientific community neglects in relation to the basic characteristics of business angels is the gender comparison of investment activity, as well as other stages of the life cycle of business angels in the Czech Republic, especially the results for the investor's exit are distorted. For this reason, further researchwill firstly focus on the specification of the characteristics of the exit strategies of angel investors in relation to their socio-demographic and investment profile. Secondly, it will attempt to identify typical persons on the supply side of informal venture capital in other countries of the Central and Eastern European region.

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OBILJEŽJA NEFORMALNOG RIZIČNOG KAPITALA U ČEŠKOJ: KVANTITATIVNO ISTRAŽIVANJE

Sažetak

U ovom se radu demografski i investicijski profili poslovnih anđela koji djeluju u Češkoj procjenjuju na temelju uzorka od 78 anđela ulagača. Ovo je prvi pokušaj korištenja podacima o aktivnostima investitora iz Pitchbook baze podataka, koja postaje sve popularnija u akademskim istraživanjima. Izvan okvira deskriptivne statističke analize provedeno je višedimenzionalno statističko istraživanje korištenjem klaster analizom. Rezultati pokazuju da u Češkoj postoje dvije skupine anđela ulagača. Prvu skupinu predstavljaju investitori koji pretežno imaju velik aktivni portfelj, kao i broj ukupno realiziranih investicija. S druge strane, drugi klaster čine investitori koji provode manji broj investicija te su također u poziciji osnivača start-upa. Nije iznenađujuće da postoje dvije glavne lokacije anđela investitora u Češkoj, Brno i Prag. Obje kategorije tipičnih investitora spajaju neke demografske karakteristike; na primjer, tržištem dominiraju sredovječni muškarci sa završenim magisterijem ekonomije koji ulažu u start-upove u području informacijskih i komunikacijskih tehnologija. Glavni doprinos rada sastoji se u procjeni demografskih i investicijskih profila anđela ulagača koji djeluju u češkom poslovnom okruženju. Rezultati istraživanja imaju implikacije na nadolazeća istraživanja, neformalnu industriju rizičnog kapitala i javnu politiku izvan češkog poslovnog okruženja te razvijaju alate za poticanje ekosustava anđela. U današnjem globaliziranom svijetu granice anđela investitora često su nejasne. Baš kao što novoosnovana poduzeća imaju ambicije međunarodnog širenja, neformalni rizični kapitalisti sve više sklapaju prekogranične poslove. Iz perspektive tvrtki u koje se ulaže i kreatora politika, važno je poznavati profile ne samo domaćih već i stranih poslovnih anđela, npr. s obzirom na postavljanje javne potpore za priljev stranog kapitala.

Ključne riječi: poslovni anđeli, anđeo investitor, rizični kapital, neformalni rizični kapital, karakteristike, analiza klastera, Češka Republika.

JEL klasifikacija: G11, G24.