

INDIVIDUAL FACTORS FOR NASCENT DIGITAL ENTREPRENEURSHIP- FIRST HYPOTHESES

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ABSTRACT

Extreme events are a challenge for any economy. That's why the state has an interest in promoting the capacity for innovation that helps to cope with extreme events and their consequences. One part of these innovations that is particularly relevant in the current pandemic is digital startups. Therefore, assessing the starting points for possible interventions to increase the number of digital startups is necessary. To shape policy interventions, this paper provides hypotheses on individual factors that can form the basis for designing these policy interventions. We first identify different factors in the pre-start-up stage influencing the individual to become a nascent entrepreneur cited in general literature and then derive hypotheses promoting nascent digital entrepreneurship. We propose to test these hypotheses in further research, for example, through experimental tests of factor effects. These findings also hold potential for practitioners.

KEYWORDS

Digital Start-Ups, Digital Entrepreneurship, Nascent Entrepreneurs, Literature Review, Individual Factors, Influencing Factors for Digital Entrepreneurs

1. INTRODUCTION

Extreme events are an enormous challenge for any economy. Covid-19 is an extreme event altering the business landscape fundamentally, illustrating the need for an overarching digital transformation of companies and start-ups (Soto-Acosta 2020). That's why the state has an interest in promoting the capacity for innovation that helps to cope with extreme events and their consequences. Digital start-ups are especially vital, as they create value for the society at large, but founders are still scarce (Global Entrepreneurship Research Association 2020; Metzger 2020). Even before the crisis, the KfW-Start-Up-Report 2020 revealed that only 70.000 start-ups originated in Germany in 2019. Entrepreneurship figures are substantially lower than, for example, in the US, where 17.4 percent of the adults engage in early-stage entrepreneurial activities, whereas in Germany, only 7.6 percent do (Bosma *et al.* 2020).

Start-ups create jobs, lead to economic growth (Ahlstrom 2010), and boost innovation, productivity, and competitiveness (Skawińska and Zalewski 2020). Naturally, one should maintain realistic expectations regarding their benefits since especially a small number of high-growth firms create new jobs (Summers 2015). Extreme events change the framework conditions and thus create new entrepreneurial opportunities and change risk perception because the risk of alternative activities changes (Kuckertz *et al.* 2020). Therefore, it is necessary to assess possible starting points for interventions to increase the number of people engaging in digital entrepreneurship.

In our research approach, we define our scope along two dimensions: life cycle phase and factor type. Firstly, different actions along a start-up's life cycle can increase the number of digital start-ups. There are several life cycle models for start-ups from different perspectives, for example, Overall and Wise (2015) from a financial perspective or Reisdorfer-Leite *et al.* (2020) with a focus on life cycle management. But all of these models have a start or pre-start phase in common, which is assessed in more detail in a model by Van Gelderen *et al.* (2006). The researchers name four phases in their model: Entrepreneurial opportunity recognition, business concept development, resource assembly or start-up creation, and product offering. In each phase, different factors are essential for aspiring, nascent, and fledgling entrepreneurs (Rotefoss and

Kolvereid 2005). Secondly, focusing on different success factors in the pre-start-up phase that influence founders or nascent entrepreneurs can increase the number of (digital) entrepreneurs. Van Gelderen *et al.* (2006) define a person who is undertaking activities to create a business as a nascent entrepreneur. Gartner (1985) identifies four dimensions for factors influencing start-ups and nascent entrepreneurship: the individual, the organization, the environment, and the process.

The following article focuses on individual factors due to two reasons. First, on an individual level, the identified factors help individuals evaluate their potential prospects and difficulties, which influence the founding decision and therefore are especially relevant for predicting the likelihood of founding a business (Rauch and Frese 2000). Second, on a macro-economic level better-designed policy measures contribute to digital start-ups' virtuous cycle (Van Gelderen *et al.* 2006). Examples for factors along these dimensions concern socio-demographic characteristics, such as age, gender, or human capital, and psychological differences of individuals, such as the perception of risk (Davidsson 2006).

To design effective interventions to increase digital entrepreneurship, we must first identify the relevant factors from the literature and hypothesize their relevance for digital start-ups. We aim to answer the following research questions (RQ) with our research:

- RQ1: Which are the factors influencing individuals in founding a start-up detailed in the literature?
- RQ2: Which are the factors influencing individuals leading to digital entrepreneurship?
- RQ3: Which factors influencing individuals the government should alter to promote digital entrepreneurship?

The following paper structures as follows: Chapter 2 provides the theoretical background. Chapter 3 details the methodological approach. The findings are presented in chapter 4 and discussed in chapter 5, including limitations and questions for further research.

2. BACKGROUND

There are different definitions in the academic and in practitioners' literature. Blank (2003), who is most cited by literature and practitioners, defines a start-up as a temporary organisation created to identify a repeatable and scalable business model. We refer to Skala (2019) for a more detailed review of definitions. In the practitioners' literature, there are very different definitions such as the one used by the European Startup Monitor, which we refer to for the purpose of this research: "1. Start-ups are younger than 10 years 2. Start-ups feature (highly) innovative technologies and/or business models 3. Start-ups have (strive for) significant employee and/or sales growth." (Kollmann *et al.* 2016, p. 15)

Several previous studies focus on different aspects of digital start-ups or entrepreneurship. For example on concept changes like an innovation of their business model (Ghezzi and Cavallo 2020), success factors like the effects of technology and consumer orientation (Guo *et al.* 2020), specific contexts like e-learning (Heryandi *et al.* 2019), or the mindset in the context of digital entrepreneurship (Zaheer *et al.* 2019). Like Dessyana and Riyanti (2017), some of these have already looked at factors of the entrepreneurs themselves, like entrepreneurial self-efficacy. Still, so far, no study has attempted to identify all relevant factors that influence nascent entrepreneurs.

The most established framework for categorizing factors influencing start-ups by Gartner (1985) identifies four dimensions. He distinguishes founders' characteristics, characteristics of the start-up, of the surrounding environment and of the process by which the start-up is set up (Gartner 1985). For the purpose of this research, we outline therefore the individual factors influencing (digital) nascent entrepreneurs. Individual factors are especially interesting as they are a prerequisite for entrepreneurship.

Since 1985 researchers have examined several factors in detail, including those relevant for nascent entrepreneurs. Van Gelderen *et al.* (2006) examined success and risk factors. They discussed several individual factors: demographics, gender, age, human capital (work experience), management experience, firm founding, and education. Davidsson (2006) studied personal factors for nascent entrepreneurs, including demographics, resources in terms of human, social and financial capital, and individual psychological characteristics such as personality traits, cognitive characteristics, and motivational patterns. To examine the relevant factors for nascent entrepreneurs of digital start-ups, the following chapter presents the method to generate an overview of these factors and propositions regarding their effect on digital start-ups.

3. METHOD

Following Linnenluecke *et al.* (2020), we first defined a clear goal for our literature review by focusing on one of the four dimensions by Gartner (1985), namely the individual in the pre-start-up phase. Hence, we only looked after and included research on nascent entrepreneurs only. We decided not to focus on specific outlets to ensure representative coverage as defined by (vom Brocke *et al.* 2015). We used Google Scholar as a citation indexing service and employed a keyword-based literature search. We used the following keywords in our search: nascent entrepreneur, nascent entrepreneurship, personal traits of founders, firm gestation, venture formation. We reviewed these publications manually for relevance and employed an iterative approach to identify further relevant publications. The references of the publications deemed pertinent to our topic were also a starting point for a systematic backward search. This literature aims to describe, explain, and summarize existing knowledge of individual factors for nascent entrepreneurs (Schryen *et al.* 2020). We also aim to include theory-building efforts in developing first propositions based on the practitioner's reports and secondary data regarding the relevance of these factors for entrepreneurs' intent on founding digital start-ups. We took the literature factors and searched for supporting evidence in government publications and practitioners' reports to achieve this.

4. FINDINGS

4.1 Individual Factors of Nascent Entrepreneurs

The literature identifies three dimensions to sort individual factors influencing nascent entrepreneurship: demographics, human capital, and psychological differences of individuals (Gartner 1985; Van Gelderen *et al.* 2006). The categories and factors within the different dimensions are further elaborated in Table 1. For demographics we outline gender, age, and ethnicity. Human capital considers especially the categories education, experience, skills, role models, and financial capital. Finally, within the psychological differences of the individuals we look at personality and cognitive characteristics as well as the motivational patterns.

Table 1. Effects of different factors on nascent entrepreneurship

Category (Factor)	Findings (Effects of the factors on nascent entrepreneurships)
Demographics	
Gender (<i>Women, men</i>)	Women are underrepresented as nascent entrepreneurs (e.g. Arenius and Minniti 2005; Davidsson 2006; Davidsson and Honig 2003; Delmar and Davidsson 2000; Reynolds 1997; Verheul <i>et al.</i> 2006 2004b) A lower female participation rate in the workforce serves to explain the finding (Verheul <i>et al.</i> 2006). Furthermore, previous research offers different explanations. On the one hand, Davidsson (2006) concludes that fundamental institutional factors, such as education and work experiences, result in the differences between male and female nascent entrepreneurs rather than "innate" differences by sex. Other research does not confirm a different relative fear of failure (Arenius and Minniti 2005; Wagner 2007) On the other hand, Minniti and Nardone (2007) show that perceptual variables explain gender differences. Women have a lower preference for entrepreneurship (Verheul <i>et al.</i> 2011), are less competitively inclined, and less willing to take risks (Bönte and Piegeler 2013). Women also have a lower risk tolerance and are less likely to have an internal locus of control (Verheul <i>et al.</i> 2011).
Age (<i>Young people, especially aged between 25-34 years</i>)	Younger people are more likely to become nascent entrepreneurs. Research shows a negative effect (increasing age reduces the probability to become a nascent entrepreneur) or curvilinear effect with a peak in the 25-34 years age cohort (Blanchflower 2004; Delmar and Davidsson 2000; Hopp and Sonderegger 2015; Lévesque and Minniti 2006; Reynolds 1997).
Ethnicity (<i>Ethnicity, minorities, immigrants</i>)	Previous studies found that some groups (such as immigrants) are over (Delmar and Davidsson 2000), whereas other groups (of immigrants) are underrepresented. The factors distinguish for the different groups, such as whites, blacks, and Hispanics in the US (Liu 2012). Possible research avenues are discrimination in the workforce market, entrepreneurial cultural heritage, and self-selection of individuals who start in a new country (Davidsson 2006).

Category (Factor)	Findings (Effects of the factors on nascent entrepreneurships)
Human Capital	
Education (<i>low to high Education level</i>)	A higher level of education increases nascent entrepreneurship. The shape of the relationship depends on the educational level. Swedish research (Davidsson 2006; Davidsson and Honig 2003; Delmar and Davidsson 2000) shows positive effects of education levels, including higher ones, whereas US and international-comparative analyses indicate that above medium levels of education do not increase the probability to become a nascent entrepreneur (Arenius and Clercq 2005; Davidsson 2006; Kim <i>et al.</i> 2003; Reynolds 1997; Wagner 2004a).
Experience (<i>Start-up experience, Self employment Management or work/industry experience</i>)	Previous start-up experience or self-employment has positive effects on nascent entrepreneurship (Davidsson 2006; Davidsson and Honig 2003; Delmar and Davidsson 2000; Kim <i>et al.</i> 2003). Some studies found that management or work experience has a weak or uncertain effect (Davidsson 2006; Davidsson and Honig 2003; Delmar and Davidsson 2000; Kim <i>et al.</i> 2003). Other research found a positive effect for years of work experience and call for a more detailed assessment of the different types of work experience (Hopp and Sonderegger 2015; Zanakis <i>et al.</i> 2012). For example, work experience in young and small firms increases the probability to found a business (Wagner 2004a).
Skills (<i>Task-relatedness; Balanced skills; Self-confidence in having the relevant skills, self-efficacy and persistence; Opportunity confidence</i>)	Knowledge and skills (outcomes of human capital investments) are more critical for young firms' success than education and experiences (human capital investments), especially when they are more task-related (Unger <i>et al.</i> 2011). People with balanced skills engage more likely as nascent entrepreneurs. The balanced skills originate from entrepreneurial talent (endowment hypothesis) as well as interests in an entrepreneurial career and entrepreneurial and managerial experiences (investment hypothesis) (Stuetzer <i>et al.</i> 2013). There is a strong effect of self-reported confidence in own skills and self-efficacy on persistence and the probability to become a nascent entrepreneur (Arenius and Minniti 2005; Chen <i>et al.</i> 1998; Hechavarria <i>et al.</i> 2012; Hopp and Sonderegger 2015; Wagner 2004b; Zanakis <i>et al.</i> 2012). A person considering an opportunity as feasible and having the confidence to own the relevant skills (opportunity confidence) is more likely to become a nascent entrepreneur (Dimov 2010).
Role models (<i>Self-employed parents, friends, or relatives</i>)	Self-employed parents, friends, or relatives acting as role models as well as being encouraging indicate positive effects on nascent entrepreneurship (Arenius and Minniti 2005; Bosma <i>et al.</i> 2011; Davidsson and Honig 2003; Delmar and Davidsson 2000; Delmar and Gunnarsson 2000; Kim <i>et al.</i> 2003; Verheul <i>et al.</i> 2011; Wagner 2004b).
Financial capital (<i>Indicators of income and household net worth</i>)	The findings are ambiguous, and the relationship between financial capital is more complicated than a simple, linear, positive one. Research assumes that opportunity-based and necessity-based entrepreneurship confound. Unemployment increases the probability of becoming an entrepreneur; however, the financial situation is not the best predictor (Arenius and Minniti 2005; Davidsson 2006; Reynolds 1997; Wagner 2004b).
Psychological differences of the individuals	
Personality characteristics (<i>Locus of control, need for achievement, innovativeness, stress tolerance, need for autonomy Risk taking</i>)	An internal locus of control increases the decision to become an entrepreneur (Verheul <i>et al.</i> 2011). Furthermore, Rauch and Frese (2007) found that the need for achievement, innovativeness, stress tolerance and need for autonomy correlate with entrepreneurial behavior of business creation. Nascent entrepreneurs do not have a higher tolerance for risk. However, they perceive existing risks as smaller (Baron 2004). Caliendo <i>et al.</i> (2009) even found in an experiment that the conventional wisdom that nascent entrepreneurs are less risk-averse, at least if they were previously employed. This finding is contrary to previous research. In the end, a lower risk aversion, or at least a risk perception, increases the probability of an individual becoming a nascent entrepreneur (Simon <i>et al.</i> 2000).
Cognitive characteristics (<i>Overoptimism; Illusion of control; Prospect theory; Fear of failure; Economic outlook; Perception of opportunities</i>)	Entrepreneurs are overly optimistic, shown by planning fallacy and base rate neglect. Instead of focusing on comparable cases and base rates, nascent entrepreneurs focus on the problems' specifics, resulting in over-optimism of plans and projections (Cassar 2010). The illusion of control and the belief in small numbers result in lower risk perception, increasing the probability to engage in nascent entrepreneurship (Simon <i>et al.</i> 2000). Another supporting factor is the overweight of small probabilities (Baron 2004). Lower fear of failure, a more positive economic outlook for family, and a higher opportunity perception are positively related to nascent entrepreneurship (Arenius and Minniti 2005; Davidsson 2006; Wagner 2004b).

Category (Factor)	Findings (Effects of the factors on nascent entrepreneurs)
Motivational patterns (<i>Push and pull factors; Rebel theory; Expectancy theory</i>)	Different push factors (for example, lack of alternatives) or pull factors (for example, seek for challenge or autonomy) motivate individuals to become an entrepreneur (Van Gelderen <i>et al.</i> 2006). In a group comparison between nascent entrepreneurs and non-nascent entrepreneurs, Carter <i>et al.</i> found no effects for innovative and financial motivation as well as self-realization or independence. Nascent entrepreneurs care less about external recognition and follow fewer role expectations. The findings support the “rebel” theory of entrepreneurship (Carter <i>et al.</i> 2003; Davidsson 2006) (Carter <i>et al.</i> 2003; Davidsson 2006). Renko <i>et al.</i> (2012) found that expectancy theory and, therefore all types of valence (attractive reward or outcome), instrumentality (greater reward if they meet performance expectations), and expectancy (the probability that efforts result in desired goals) are related to a conscious effort.

In the following chapter, we examine the relevance of these factors for digital entrepreneurs and develop the first hypotheses regarding their effect.

4.2 Hypotheses Regarding the Relevance for Digital Start-Ups

To design interventions to increase the number of nascent digital entrepreneurs and digital start-ups, we developed eight hypotheses addressing the categories mentioned above. The developed interventions serve as starting points. Future research is required to design more interventions, for example, regarding the category gender by evaluating STEM education or risk tolerance of women.

Research on digital entrepreneurship is growing and covers various facets such as digital mindset, gender differences, and human capital. A digital mindset promotes successful digital start-ups. A deep understanding of the open, faster scalable, generative nature of digital technologies combined with an entrepreneurial attitude fosters digital entrepreneurship (Zaheer *et al.* 2019). Other research found that the internet is not a meritocratic space for entrepreneurship, but instead, it reproduces specific offline effects such as social positionality and connected resource constraints (Dy *et al.* 2017). Literature also evaluates founders' human capital in technology firms, revealing that complementary skills such as technical education and commercial experience (Ganotakis 2012). Our hypotheses build on these findings and propose further research.

Starting with the first dimension, demographics, according to the practitioner’s literature, women are less likely founding start-ups in the sector of information and computer technology than men (Hirschfeld *et al.* 2020). We assume that, among other factors, especially the lack of female role models, reinforces this discrepancy. Since research has shown a strong influence of role models on nascent entrepreneurs (Arenius and Minniti 2005; Bosma *et al.* 2011; Davidsson and Honig 2003; Delmar and Davidsson 2000; Delmar and Gunnarsson 2000; Kim *et al.* 2003; Verheul *et al.* 2011; Wagner 2004b), we propose to test the following hypothesis: *Hypothesis 1 (gender): Female digital entrepreneurs acting actively as role models promote female digital entrepreneurship.*

As previous research has shown, the affinity towards digital technologies, such as the acceptance of internet technologies, decreases with age (Niehaves and Plattfaut 2014). We assume that a lack of acceptance regarding digital technologies also negatively influences the intention to become a nascent digital entrepreneur. Therefore, the second hypothesis is: *Hypothesis 2 (age): Increasing technology acceptance for older people promote digital entrepreneurship among them.*

We assume that there are no peculiarities regarding nascent entrepreneurship in digital start-ups for the category of ethnicity. Regarding the second dimension, human capital, the financial aspect is not as crucial for digital start-ups as for start-ups in many other sectors. As marginal costs of software are low and especially cloud technologies allow low-cost testing of ideas, most digital start-ups should not require enormous upfront costs as in other industries, such as in the pharmaceutical sector (Zaheer *et al.* 2019). Therefore, we focused on hypotheses 3 - 6 on increasing nascent entrepreneurship by higher digital education levels, more IT (start-up) experiences, IT-related skills, and successful digital entrepreneurs acting as role models.

Hypothesis 3 (education): Education in STEM and related fields increases digital entrepreneurship.
Hypothesis 4 (experience): Prior work in IT start-ups, IT departments, or other IT related contexts increase digital entrepreneurship.

Hypothesis 5 (skills): Coding skills or other relevant digital skills increase digital entrepreneurship.
Hypothesis 6 (role models): More positive successful national digital entrepreneurs could function as role models and increase digital entrepreneurship.

In the third dimension, psychological differences of the individuals, hypothesis 7 and 8 focus on the cognitive characteristics and motivational patterns since personality characteristics are supposed to be very stable. Regarding cognitive characteristics, we derive the following two hypotheses: *Hypothesis 7 (cognitive characteristics): Following prospect theory, framing risks of digital start-ups differently or putting them into different contexts increases digital entrepreneurship.*

Hypothesis 8 (cognitive characteristics): Improving the skills to perceive digital opportunities and transfer technological solutions from other contexts increases digital entrepreneurship.

5. DISCUSSION

We identified several factors influencing individuals in founding or not founding a start-up detailed in the literature, along our two research questions. We then developed hypotheses regarding the relevance of the factors in influencing individuals regarding digital entrepreneurship.

Our findings offer several theoretical and practical contributions. The three significant theoretical contributions are: Firstly, our results represent an overview of individual factors influencing an individual's probability to become a (nascent) entrepreneur for start-ups in general. This overview represents the first step to develop a more comprehensive model describing individual factors which influence people to become engaged in digital start-up efforts. Secondly, we derived hypotheses regarding the relevance of these factors for digital start-ups. Thirdly, we propose the first experimental approaches to test for the effectiveness of countermeasures. The findings also have two practical contributions on different societal levels: On the individual level, this overview of individual factors can support an individual in rationalizing and structuring the decision to become a digital entrepreneur. On a broader level, we identify the factors that ultimately lead to an individual's decision to engage in digital entrepreneurship and, therefore, levers of governments to increase digital entrepreneurship and economic growth in the long run by shaping these factors.

This research comes with some limitations. The pre-funding “process” was considered as one step albeit it can be detailed further. We focused on factors relevant to increase digital entrepreneurship. The factors relevant in that phase might have a negative impact on the start-ups development in its later life cycle. Finally factors might overlap e.g., gender and role modeling in the case of a lack of female role models. Here further research regarding interdependencies of factors is necessary.

Future research should focus on a qualitative study in interviews, focus groups, and observations to develop a holistic model, including the direct and indirect effects of the different factors. Researchers should then test this developed model in quantitative studies (e.g., experiments). The model should focus on individual factors since they seem to drive nascent entrepreneurs (qualitative study). It should also include environmental, organizational, and process factors to achieve a comprehensive model (Rotefoss and Kolvereid 2005). These efforts should be to test effective means to influence the number of nascent entrepreneurs positively. In this regard, it can also be helpful to assess the effect of measures separately as an intermediary step.

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