



**Cognitions Affecting Innovation Among Generation Z
Entrepreneurs: The External Enablement of Digital
Infrastructure**

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Cognitions Affecting Innovation Among Generation Z Entrepreneurs: The External Enablement of Digital Infrastructure

Abstract

Objective: The current research aimed to investigate the external enablement role of Digital Infrastructures (DI) in the interplay of entrepreneurial cognitions and innovation.

Methodology: Data from the Global Entrepreneurship Monitor (GEM) and Digital Economy and Society Index (DESI) were used for analyses. This yielded a sample of 8601 Generation Z entrepreneurs operating in 25 European countries.

Results: Applying hierarchical moderated regressions showed that socio-cognitive components of an entrepreneurial mindset (self-efficacy, risk propensity, opportunity identification) affect innovation among Generation Z entrepreneurs. More importantly, DI plays an external enablement role in the interplay of cognitions and innovation among Generation Z entrepreneurs.

Originality/Value: We contribute to the socio-cognitive theory of entrepreneurship by integrating an external enablement perspective into the study of cognitions and entrepreneurial outcomes (here, innovation). We contribute to the digital technology perspective of entrepreneurship by connecting the conversation about the socio-cognitive perspective of entrepreneurship regarding the role of cognitions in innovation to the conversation in information systems (IS) regarding technology affordances and constraints. We extend the application of the external enabler framework to the post-entry stage of entrepreneurial activity and integrate a generational perspective into it.

Keywords: Entrepreneurial mindset, cognition, innovation, growth, self-efficacy, opportunity identification, risk, Generation Z

Introduction

Innovation has been defined as creative destruction that brings competitive advantage and market selection effects to the firms. Factors at different levels interact to actualise the innovative potential of the firm. Among individual-level factors, having an entrepreneurial mindset has been proven to affect innovation (Ashourizadeh et al., 2014; Benedict & Venter, 2010; Kuratko, Fisher, et al., 2021; Kuratko, Hornsby, et al., 2021). An entrepreneurial mindset can have different cognitive, behavioural, and emotional components (Kuratko, Fisher, et al., 2021; Kuratko, Hornsby, et al., 2021). Factors such as self-efficacy, risk-willingness, and opportunity identification have been recognised as cognitive components of the entrepreneurial mindset. Both theoretical and empirical evidence highlight their importance to innovation and corporate entrepreneurship. According to the socio-cognitive theory, these cognitions are knowledge structures and mental models that optimise the performance of individuals in given contexts (Bandura, 2015). In entrepreneurship, these knowledge structures will be used for assessment, judgment, and decision-making about opportunity evaluation and pursuing growth strategies (Kuratko, Hornsby, et al., 2021) and lead to innovation (Ashourizadeh et al., 2014; E. Ettl et al., 2014; Howells, 1995; Loasby, 2006).

However, there are different lines of reasoning that these cognitive mechanisms of mindset on innovation can vary across countries with different levels of digital infrastructure development. DI can be considered an “external enabler” (Davidsson, 2015), affecting these knowledge

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3 structures related to innovation. We argue that this enablement role entails knowledge
4 acquisition, assimilation, and transformation mechanisms that can shape or change the
5 entrepreneurs' mental models and, thus, change the resource acquisition, allocation, and
6 integration toward innovation. DI can facilitate the acquisition of knowledge about market
7 needs and potential market trends through search possibilities (Forman & Van Zeebroeck,
8 2019; Yin & Yu, 2022), assimilating it through social media communications or open-source
9 innovation communities (Zhang & Hon, 2020; Zhang et al., 2014), and transforming it to a new
10 knowledge toward innovation by increasing complementarities (Bruno et al., 2023; Zakaryan,
11 2023). These knowledge-related mechanisms enabled by DIs can improve the acquisition of
12 substitutive or primary resources and raw materials through search possibilities (Appio et al.,
13 2021; Savino et al., 2017). They can also enhance resource allocation by compressing the time
14 and resources necessary for innovation, leading entrepreneurs to experiment with new ideas
15 faster and with lower operational costs (Kallinikos et al., 2013). Finally, they help combine and
16 integrate different resources for creating new products and services through complementarities
17 (Bruno et al., 2023; Zakaryan, 2023). Hence, the digital infrastructure's knowledge acquisition,
18 assimilation, and transformation mechanisms can enable the cognitive processes of innovation.

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22 This enablement role can be crucial for Generation Z entrepreneurs. Generation Z is a cohort
23 of individuals born in the mid-1990s (Kubátová, 2016; Rodriguez et al., 2019; Singh & Hess,
24 2017; Turner, 2015; Yazici & Arslan Ayazlar, 2021). Those individuals who own a business
25 can be classified as entrepreneurs (Kelley et al., 2012). Thus, we define Generation Z
26 entrepreneurs as individuals born in the mid-1990s and owning businesses. Generation Z is
27 growing up in the age of transformations such as social media, the Internet of Things, advanced
28 robotics, and artificial intelligence (Lifintsev et al., 2019). Using technology and being
29 connected to the Internet have become integral to their lives. They integrate social media into
30 every aspect of their lives, including conversations, learning assessments, work, and play
31 (Barhate & Dirani, 2022; Madden, 2019). Entrepreneurs can employ digital technology as a
32 knowledge access and recombination source for actualising their growth aspirations
33 (Chillakuri, 2020; Silinevica & Meirule, 2019).

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37 Therefore, convincing grounds exist to argue that DI can expectedly enable cognitive
38 innovation formation mechanisms among Generation Z entrepreneurs by affecting knowledge
39 structures related to innovation decisions and outcomes. However, to the best of our
40 knowledge, there needs to be empirical evidence on the enablement role of DI in the interplay
41 of cognitions and innovation, specifically among Generation Z entrepreneurs. The current
42 research aimed to fill this gap by answering the question: Is cognitions' effect on innovation
43 contingent on the enablement role of DI among Generation Z entrepreneurs?

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46 We adopt the external enabler (EE) framework as our theoretical perspective to test our
47 hypotheses on a sample of Generation Z entrepreneurs in 25 European countries extracted from
48 the GEM survey. We combine DESI with GEM data to be able to test our hypotheses. Our
49 findings suggest that a higher level of economic digitalisation increases the benefit of socio-
50 cognitive components of entrepreneurial mindset for innovation in Generation Z entrepreneurs.
51 More specifically, DI externally enables the cognitive mechanisms of innovation among
52 Generation Z entrepreneurs.

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55 **We contribute to the external enablement framework by providing empirical evidence on how**
56 **DI can enable cognitive processes and mechanisms of innovation among Generation Z**
57 **entrepreneurs. The existing research on external enabler frameworks has studied potential**
58 **entrepreneurs, in which the researchers have been interested in the enabler role of external**
59 **factors in the venture creation process (e.g., Chalmers et al., 2021; von Briel et al., 2018). We**
60 **provide evidence on the relevance of the framework for real entrepreneurs. We contribute to**

the socio-cognitive theory of entrepreneurship by showing that the effect of socio-cognitive mechanisms of innovation among Generation Z entrepreneurs can be contingent on the enablement mechanisms of digital infrastructures.

2. Theoretical Foundations

2.1. Social cognitive theory

SCT provides an insightful framework to explain underlying mechanisms through which individual dispositions lead to behaviour (Hmieleski & Baron, 2009). SCT explains how individuals influenced by the surrounding environment feel, think, and behave (Shaver & Scott, 1992). The critical assumption behind SCT is that human action and behaviour are neither mere conduits of external forces nor entirely governed by internal desires (Garcia et al., 2019). In effect, SCT postulates that the connection between personal factors (i.e., sex, age, profession, beliefs, cognitive competencies, or emotional states) and behavioural outcomes conditioned by the external environment (Bandura, 2012; Boudreaux et al., 2019; Garcia et al., 2019). Hence, context directly shapes individuals' cognitive traits or moderates their relationship with behaviours (Ng & Lucianetti, 2016). Bandura (1986b) conceptualises the third dimension of SCT (i.e., behaviour) as the outcome of shared interaction between agential and environmental inputs.

SCT has been employed in different disciplines (Nwosu et al., 2022), such as organisational decision-making, employee behaviour, and technological innovation adoption (Park et al., 2017). Extensive research within the entrepreneurship domain has been conducted relying on SCT. For example, Ng and Lucianetti (2016) examined how a collectivistic orientation may affect the relationship between self-efficacy and agentic behaviour. Park et al. (2017) explored the interaction between cognitive capabilities (prior knowledge), environmental factors (social media usage), and behavioural factors (opportunity identification or creation). Kushev et al. (2019), in their study, have examined the interplay among entrepreneurs' social connections and capability to acquire funding (i.e., individual factors), availability of resources and economic growth (i.e., environmental factors), and opportunity evaluation. Boudreaux et al. (2019) have found that the strength of the relationships between cognitive capabilities (i.e., self-efficacy and identification of opportunities depend on the institutional constraints in the entrepreneur's environment. According to SCT, individual-level characteristics and the external environment affect the development of individuals' cognitions, emotions, passion, etc. (Bandura, 2015). SCT is one of the worthwhile theoretical achievements that recognises the multilevel perspective to understand the complex phenomenon of entrepreneurship (Schade & Schuhmacher, 2022).

According to these arguments, we employ SCT and incorporate some insights from the E framework into it. Such an integration provides a valuable framework to study the mechanisms through which cognitive and environmental factors interact to explain entrepreneurial action (Bacq et al., 2017). Secondly, combining SCT with the EE framework has the potential to explain the complexities of human behaviour from a broader perspective that considers the contingencies governing the cognitions and their behavioural outcomes. Therefore, such an approach can be valuable in conceptualising human behaviour in a rapidly changing environment (here, digitalised contexts), specifically, entrepreneurial behaviour (Aeeni & Saeedikiya, 2019). Furthermore, while SCT offers a suitable theoretical lens to examine innovative behaviour incorporating agent-context dynamics (Ng & Lucianetti, 2016), strengthening its explanation power with a theory of entrepreneurship that considers environmental changes as the enablers of entrepreneurial behaviour extends its potential to capture innovation and entrepreneurship dynamics.

2.2 External enabler framework

The external enabler is a framework to theorise how external forces entice individuals into venture creation processes. External enablers are characterised as significant changes (e.g., regulatory changes, technological breakthroughs, natural disasters, or demographic shifts) which occur in the business environment and benefit some entrepreneurs but suppress others (Davidsson, 2015, 2020; Davidsson et al., 2018, 2020, 2022; Kimjeon & Davidsson, 2022). In effect, the favourability of any EE is selective, subjective, interdependent, and uncertain (Davidsson, 2015; von Briel et al., 2018). Aligned with underlying assumptions of the disequilibrium economy (Arend, 2014), EEs are distinct, agent-independent, and disequilibrating changes in the environment that may be triggered by unpredictable exogenous shocks (e.g., economic crises, terrorist attacks or technological breakthroughs) or may happen gradually (e.g., climate change) (Davidsson et al., 2020; McGee & Terry, 2022).

EEs conceptualise in terms of their *characteristics*, *mechanisms*, and *roles*. EEs scope dimensions include sectoral (i.e., concerns the range of industries potentially affected by an external enabler), spatial (i.e., refers to the geographical area affected by the enabler), and temporal (refers to the duration of change enablement). EEs' three major roles may be triggering, outcome-enhancing, and shaping. The triggering role encourages would-be entrepreneurs to initiate new venture creation. The shaping role helps entrepreneurs in shaping the venture itself, products or services, business operations, and markets. The outcome-enhancing role impacts venture performance, such as growth or expansion to foreign markets. EEs also facilitate new venture creation and success through some kinds of mechanisms, including compression (which reduces the amount of time required to perform an activity), conversion (which reduces the number of resources required to act), expansion (increasing the availability of a resource), substitution (replacing one resource with another), combination (bundling a set of resources to devise a new process or outcome) and generation (creating new devices or functionalities) (Davidsson et al., 2018, 2020; Kimjeon & Davidsson, 2022; von Briel et al., 2018). Relying on the combination of these functions, EEs provide a fertile context for explaining entrepreneurial ventures' emergence, growth, and performance.

2.3. Generation Z as Entrepreneurs

Generation Z already represents a considerable part of society. Scholars have used different labels and birth ranges to identify Generation Z individuals. They are labelled .net, iGen, or e-Generation (Vieira et al., 2020). Theoretically, different criteria have been used to distinguish Generation Z from Generation X, Y, and baby boomers. Factors such as lifestyle, openness to communication, cultural tolerance or intelligence, birth year, economic approach, employment preferences, psychological characteristics, and concurrency of their birth with the socio-technical trends have been used to identify Generation Z and distinguish them from other generations. Amongst all, their birth year and its concurrency with the specific historical, socio-cultural, or technological changes, have been the most acknowledged criteria. In terms of birth year, although there is no consensus on the exact year, the mid90s has been widely recognised as Generation Z's birth year range (Kubátová, 2016; Rodriguez et al., 2019; Singh Ghura, 2017; Turner, 2015; Yazici & Arslan Ayazlar, 2021).

Regarding the concurrency of their birth with the socio-technical, cultural, and historical changes, Generation Z's birth coincides with the socio-cultural, political, and, more importantly, technological transformation (such as globalisation, the rapid development of digital technology, and liberalisation movements for minority groups that have led them to adopt a completely different lifestyle, way of thinking, time spending pattern, career choice and form of interaction (Madden, 2019). Growing up in the age of transformations such as

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3 social media, the Internet of Things, advanced robotics, and artificial intelligence (Lifintsev et
4 al., 2019), using technology and being connected to the Internet have become an integral part
5 of their lives. They integrate social media into every aspect of their lives, including
6 conversations, learning assessments, work, and play (Barhate & Dirani, 2022; Madden, 2019).
7 While some see Generation Z as a generation stuck looking at their phone, others consider them
8 the game changers shaping the world around us (Vițelar, 2019).
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11 Called “living-online” ones (Lifintsev et al., 2019), “technologically fluent” (Fratrièová &
12 Kirchmayer, 2018), “globally focused” (McCrinkle & Wolfinger, 2009), or “digital natives”
13 (Duffett, 2017), Generation Z have bold characteristics such as optimism and self-confidence
14 (Iorgulescu, 2016), goal-orientation(Williams, 2019), pragmatism (Dill, 2015), high
15 achievement-orientation, thoughtful and responsible (Seemiller & Grace, 2017), agile and
16 adaptive (Gabrielova & Buchko, 2021), and open and tolerant to cultural diversity in everyday
17 life (Lifintsev et al., 2019). They consider ethical values (Flippin, 2017; Priporas et al., 2017),
18 prioritise work-life balance (Dill, 2015), pursue meaningful careers(Dolot, 2018; Schroth,
19 2019), and seek continuous development (Kubátová, 2016).
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22 Regarding entrepreneurial orientations, Generation Z individuals mostly prefer entrepreneurial
23 careers (Flippin, 2017; Gabrielova & Buchko, 2021; Howe & Nadler, 2012; Priporas et al.,
24 2017). According to a survey, over half of Generation Z worldwide indicated an interest in self-
25 employment and starting their own company.” Generation Z entrepreneurs can employ
26 technology to aid them in their knowledge for success as entrepreneurs (Chillakuri, 2020;
27 Silinevica & Meirule, 2019). They rarely experience their world without the internet,
28 computers, and mobile phones. They leverage digital technology to create their businesses,
29 deliver their products/services to the market, and interact with stakeholders (investors,
30 suppliers, employees, and customers).
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33 Putting much emphasis on using digital devices, connecting to the internet, and being on social
34 media are critical aspects of Gen Z lives (Duffett, 2017; Vițelar, 2019). Most parts of their
35 everyday life, including conversion, learning, play, and work, have occurred on digital
36 platforms (Barhate & Dirani, 2022; Lifintsev et al., 2019; Madden, 2019; McCrinkle &
37 Wolfinger, 2009; Vizcaya-Moreno & Pérez-Cañaveras, 2020). Hence, being “technology
38 fluent” (Lifintsev et al., 2019), “digital natives” (Schroth, 2019), and “online living”
39 (Fratrièová & Kirchmayer, 2018) Gen Z have been overwhelmed with a vast amount of
40 information. Although, as would-be entrepreneurs, most of Gen Z, with no prior business
41 ownership experience, lack entrepreneurial expertise. Such experience in the form of human
42 capital is considered one of the most important resources for entrepreneurship (Alvarez &
43 Busenitz, 2001; Dimov, 2010; Pindado et al., 2023; Ruiz-Jiménez et al., 2021; Ucbasaran,
44 Alsos, et al., 2008; Ucbasaran et al., 2009; Wiklund & Shepherd, 2008). More importantly,
45 human capital can be a lever to access other critical resources such as financial, material,
46 technology, or strategic business networks (Cooper et al., 1994; Greene & Brown, 1997;
47 Westhead et al., 2005). In such a situation, despite having access to lots of information, Gen Z
48 entrepreneurs lack experience and complementary critical resources. These qualities render
49 them a resource-poor yet information-rich generation of entrepreneurs.
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53 In line with the theoretical discussions presented in this section, the current research defines
54 and operationalises Generation Z entrepreneurs as the cohort of individuals born in 1996 and
55 afterwards who own a business. This definition is clear and parsimonious, lacks circularity,
56 avoids tautology, and thus, meets the definition criteria (Suddaby, 2010). Moreover, it aligns
57 with previous efforts in defining other generations of entrepreneurs using age cohorts. It also
58 corresponds to GEM’s definition of entrepreneurs owning businesses (Kelley et al., 2012).
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2.4. Study Context

Europe has experienced disruptive events in the last decades. Regarding changes in the socio-political system, the development of the European Union has affected some radical legislative and constitutional changes in different countries with different socio-cultural values. Political instabilities have affected jobs and the unemployment rate (Ferrera & Gualmini, 2004) and have had other implications for innovation and intellectual property systems (Svensson, 1998). Significant changes have occurred in terms of access to digital technologies and infrastructure. These developments have been informed by purchasing power, income per capita, digital competencies, and other socioeconomic and cultural factors. Similarly, these factors have been influenced by technological changes and disruptions in digital technologies with different implications for different countries across Europe. These differences have led some authors to acknowledge the heterogeneity of Generation Z in Europe. They talk about “Generation Z in Europe” rather than “European Generation Z” to recognise their differences apart from their similarities (Scholz, 2019, p. 4). Generation Z is a digitally savvy and connected generation. Europe is also heterogeneous in terms of DI. This leaves some questions regarding how these differences can lead to performance differentials of this generation in their businesses. Therefore, it is relevant to answer how interdependence and interaction of DIs with entrepreneurs’ characteristics (here, cognitions) or firm’s resources and competencies can affect Generation Z entrepreneurs’ innovative performance in Europe.

3. Literature review and hypotheses development

3.1 Baseline Hypotheses

Individuals’ cognitive capabilities are critical in shaping attitudes, behaviours, and performance (Newman et al., 2019). Hence, the cognitive perspective is a theoretical lens through which scholars explain some of the most critical questions in entrepreneurship (Baron, 2006; Gaglio & Katz, 2001; Tang et al., 2021; Tang et al., 2012). SCT argues that there is a triadic mutual relationship among contextual inputs, cognitive factors, and behavioural outcomes (Dheer & Lenartowicz, 2019; Wang & Juan, 2016).

Rooted in SCT, Agency perspective (Newman et al., 2019), and Theory of Planned Behavior (Ajzen, 1991), self-efficacy refers to individuals’ belief in their knowledge and abilities to accomplish a given activity (Newman et al., 2019) and subsequently shaping the environment and achieving some outcomes (Santos & Liguori, 2020). In effect, self-efficacy manifests in individuals’ perception of a given situation and how they respond to it (Gielnik et al., 2015). Two critical components of career choosing and development (e.g., interest and persistence) have been motivated by one’s confidence in their ability to pursue a given path (Burnette et al., 2020). Considering self-efficacy as a domain-specific (McGee & Terry, 2022; Santos & Liguori, 2020) ability, Entrepreneurial Self-Efficacy (ESE) as a construct measures the degree to which individuals perceive themselves as capable of accomplishing business-related activities (e.g., recognising opportunities, mobilising resources, market research, product development) (Chen et al., 1998). So, strong ESE can strengthen the link between goal development and goal fulfilment (Bandura, 1991; Chen et al., 2015; To et al., 2020). Through underestimating difficulties, paying less attention to obstacles (Beck & Schmidt, 2018), and strengthening entrepreneurs’ commitment and perseverance (McGee & Terry, 2022), ESE motivates individuals to successfully undertake entrepreneurial careers (Miao et al., 2017; Newman et al., 2019; To et al., 2020). Additionally, ESE makes entrepreneurs more passionate about business development (Cardon & Kirk, 2015). Self-efficacious entrepreneurs believe that they perform better than others in the business. With more confidence in their capabilities, self-efficacious entrepreneurs prefer to set higher expectations and are more willing to exhibit

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3 innovative behaviour (Chen & Zhou, 2017; Wei et al., 2019; Wei et al., 2020). In this vein,
4 promoting innovation is a critical demonstration of ESE (Barakat et al., 2014).
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6 Similar to ESE, opportunity identification has been widely acknowledged as a critical step in
7 developing new goods/services, markets, and processes (Shane & Venkataraman, 2000;
8 Venkataraman, 1997). Therefore, one of the critical research domains in entrepreneurship is to
9 understand how and under what conditions entrepreneurs' perception of a desirable market,
10 service, or product actualises in practice. It can be claimed that OI has emerged as a field of
11 entrepreneurship research in its own right (Cooper & Park, 2008; Park, 2005; Shane &
12 Venkataraman, 2000; Venkataraman, 1997). As the first part of the entrepreneurial process
13 (Bygrave & Hofer, 1992; Gaglio, 2018; Valliere, 2013), OI deals with connecting the
14 product/services to the existing demand (Dyer et al., 2008) that leads to creating and nurturing
15 new businesses (Park, 2005). Hence, OI is a cognitive process that can substantially add to our
16 understanding of how new ideas are initiated and pursued (Cohen et al., 2021; Gaglio, 2018).
17 Entrepreneurs identify market gaps and introduce new products, services, or processes to fill
18 those gaps before others (Ucbasaran, Westhead, et al., 2008; Vedula et al., 2019). Individuals
19 who have identified opportunities can formulate an image of the future, reflected in new ideas
20 about products, services, processes, markets, etc. Imagination and creativity behind OI lead
21 entrepreneurs toward seeing new possibilities regardless of little clues (Gaglio & Katz, 2001).
22 OI empowers individuals to innovatively associate information found in the environment and
23 synthesise it with accessible resources toward developing new ideas (Baron, 2006; Lim &
24 Xavier, 2015). By making entrepreneurs aware of changes, opportunities, and overlooked
25 possibilities, OI adds substantial value to business gaps in the form of innovative outputs (Lau
26 et al., 2007). In this vein, OI drives a person to acquire, organise, and interpret information in
27 different ways, enabling them to consider various scenarios and situations, which, in turn,
28 improve firm innovativeness (Baron, 2006; Gaglio & Katz, 2001; Gielnik et al., 2015; Guo et
29 al., 2017; Maxwell & Westerfield, 2002; Poblete, 2018).
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34 Risk-taking is another aspect of the entrepreneurs' cognitive mindset. It refers to activities
35 implemented to take initiatives with uncertain outcomes (Alvarez & Barney, 2007; Wiklund &
36 Shepherd, 2003; Zahra, 2018). Huybrechts et al. (2013) operationalise risk-taking as
37 individuals searching for new opportunities to improve firm performance despite unexpected
38 and uncertain outcomes. As Baird and Thomas (1985) described, risk-taking is "venturing into
39 the unknown". Individuals with higher risk-taking levels perceive the business environment as
40 more supportive of opportunity sensing, recognising, and seizing (Guo & Jiang, 2020; Zhao et
41 al., 2021). Higher levels of risk-taking lead individuals to tolerate uncertain situations and
42 allocate resources without considering the consequences. So, risk-takers embrace different or
43 new business ways (Guo & Jiang, 2020). Although hostile unsupportive environments intensify
44 negative emotions in people (Li et al., 2022), research evidence has found that risk-takers assess
45 market information with a positive frame (Wang & Juan, 2016). Risk-takers are inclined to
46 challenge the status quo and bring new opportunities, solutions, and methods despite uncertain
47 outcomes (Dess & Lumpkin, 2005; Vora et al., 2012). In this vein, risk-takers embrace more
48 unique and creative but uncertain paths (Guo & Jiang, 2020; Zaleskiewicz et al., 2020) toward
49 innovation (Kollmann & Stöckmann, 2014; Zhao et al., 2021).
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53 On an individual micro-level, SCT suggests that personal socio-cognitive traits, i.e.,
54 entrepreneurial self-efficacy, opportunity identification, and risk-taking willingness, are
55 essential to innovation behaviour mechanisms. Hence, we propose the following hypotheses:
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58 **Hypothesis 1a (H1a).** Generation Z Entrepreneurs' Self-efficacy is positively associated with
59 their innovation.
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3 **Hypothesis 1b (H1b).** Opportunity identification is positively associated with Generation Z
4 Entrepreneurs' innovation.
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6 **Hypothesis 1c (H1c).** Generation Z Entrepreneurs' risk-taking is positively associated with
7 their innovation.
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10 **3.2 External Enablement Mechanisms of DI**

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12 Many phenomena and events in entrepreneurship tended to be explained using agent-centric
13 analysis (Davidsson et al., 2018). While the cognitive perspective has developed as an
14 insightful sub-area in entrepreneurship, uncovering how individuals decide, choose, and
15 behave, it still needs an understanding of the interaction between individual-related and
16 context-related factors (Kadile & Biraglia, 2022). Entrepreneurs do not operate in a vacuum.
17 Contextual circumstances influence entrepreneurs' behaviour and provide information,
18 resources, and networks supporting individuals' initiatives (Chen et al., 2020). Although the
19 performance of small firms largely depends upon entrepreneurs' cognitive capabilities (Shaver
20 & Scott, 1992; Timmons et al., 2004), there is a limited understanding of the mechanism of
21 how cognitive capabilities influence behaviour outcomes, especially innovation (Wei et al.,
22 2020). Relying on SCT explaining the nexus of environmental output-individual factors-
23 behavioural outcomes, it can be argued that the individual cognitive capabilities-innovation
24 behaviour relationship may be context-specific.
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28 Infrastructures, as one aspect of the context, function as a platform for running businesses and
29 provide new possibilities individuals could employ to expand their initiatives (Alvarez &
30 Busenitz, 2001). Presenting potential assets for entrepreneurs, infrastructure enhances the
31 probability of new businesses' desirability and feasibility (Nambisan, 2017). As an essential
32 aspect of a country's entrepreneurial ecosystem and as an external enabler at the national level
33 (Alderete, 2014; Audretsch et al., 2015; Nambisan, 2017), infrastructures directly and
34 indirectly influence the process, level, form, and outcome of entrepreneurial activity (Brieger
35 et al., 2022).
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38 Aligned with rising digital transformation and developing digital breakthroughs, an interesting
39 research stream has focused on DI and its effect on entrepreneurial activity (Barnett et al., 2019;
40 Kotnik & Stritar, 2015). As a shared, open, unbounded, heterogeneous, and evolving socio-
41 technical platform, DI consists of a set of IT capabilities, their users, operations, and design
42 (Hanseth & Lyytinen, 2016; Henfridsson & Bygstad, 2013; Islind et al., 2019; Tilson et al.,
43 2010) that jointly contribute to the functioning of an information ecosystem (Tilson et al.,
44 2010). Beyond transforming business operations and structures of existing companies (Matt et
45 al., 2015), DIs lead to emerging entirely new businesses and industries (Berger et al., 2021).
46 Hence, it can be argued that digital technologies can be understood as external enablers
47 stimulating and facilitating the entrepreneurship process and outcome (Davidsson et al., 2020;
48 von Briel et al., 2018).
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51 Thus, we can propose that entrepreneurs' cognitive capabilities, i.e., self-efficacy, opportunity
52 identification, and risk-taking, can be obtained, modified, and enhanced by exposure to the
53 context (Chen et al., 1998; Shepherd, 2004; Wei et al., 2020). So, although these theoretical
54 reasonings highlight that the influence of cognitive capabilities on innovation behaviour can
55 be explained according to the enabling influence of DI, there is less empirical evidence on the
56 effect of DIs in promoting innovation behaviour (Brieger et al., 2022; von Briel et al., 2018).
57 We combine the agent-centric social cognitive theory (SCT) (Bandura, 1986b; Sherman et al.,
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2015) with the context-centric EE framework (Davidsson et al., 2020) to uncover how DIs reinforce the stimulating influence of individuals' cognition on innovation behaviour.

3.2.1 Moderating the Effect of Self-efficacy on Innovation.

There is extensive research evidence that explores the connection between ESE and entrepreneurial intention, behaviour, and performance (Newman et al., 2019; To et al., 2020; Wach & Bilan, 2021; Wu et al., 2019; Zhao et al., 2021). Self-efficacy is an essential predictor of an entrepreneur's motivation (Newman et al., 2019), intention (Bergenholtz et al., 2021; Tsai et al., 2016), choice (Bandura, 2012; Fouad & Santana, 2017), outcome expectation (Liguori et al., 2020), growth expectation (Saeedikiya & Aeeni, 2020; Saeedikiya, Aeeni, et al., 2021), and performance (Newman et al., 2019; Wales et al., 2019).

A growing number of studies have examined the effect of ESE on a range of entrepreneurial outcomes, especially growth and innovation (Newman et al., 2019). Although, despite confidence in their abilities, only some entrepreneurs transform their ESEs into innovation in practice (Baron & Markman, 2003). SCT states that external context directly or indirectly influences individuals' psychological or self-regulatory mechanisms (Bandura et al., 2001). This influence could be by moderating the individuals' socio-cognitive traits-behaviour relationship (Lent et al., 1994).

An extensive, diverse set of novel and powerful digital technologies in various forms of products or services, platforms, tools, applications, components, or media content and platforms embedded in DI have emerged in the last decade (Nambisan, 2017; Nambisan et al., 2019; Nambisan & Zahra, 2016). This package of possibilities and affordances directs entrepreneurs to leverage existing knowledge, information, and networks to expand their businesses. Firstly, DI potentials foster the entrepreneurs' knowledge base by providing vast information on customers' unanswered needs, environmental constraints and inefficiencies, existing and emerging technologies, and shaping trends in the market (local, national, and foreign). Such awareness makes it easier for entrepreneurs to utilise achieved knowledge to devise novel initiatives (Brieger et al., 2022). Secondly, DI enables entrepreneurs to access various existing market stakeholders (e.g., suppliers, investors, strategic partners, customers), improve their current networks, or build new constructive partnerships. New technologies fuel new forms of interaction among business partners and businesses and their current and future customers, which can lead to accelerating and scaling up entrepreneurial initiatives (Huang et al., 2017; Srinivasan & Venkatraman, 2018).

Learning gained through Dis helps Generation Z entrepreneurs optimise their capabilities to effectively direct their self-efficacy to innovative performance. In effect, DI facilitates selecting feasible and desirable options for innovative performance (Wei et al., 2020; Zhang & Gu, 2015). Regarding significant uncertainty behind the innovation process and outcome (Jalonen, 2012; Linder & Williander, 2017), Generation Z entrepreneurs reflect upon and identify as many risks as possible associated with innovation behaviour. While self-efficacy beliefs suggest that Generation Z entrepreneurs are well-equipped to achieve their goals, DI access-related mechanisms through minimising risk or maximising the success of initiatives can affect the degree to which self-efficacy beliefs can result in entrepreneurial innovation. Resources availability and accessibility encourage people to be confident in their capability to perform in a certain way. In this vein, they will possess more positive feelings about their goal and a higher willingness to achieve it and realise optimised outcomes (here innovation) (Shahab et al., 2019).

Entrepreneurs' perception of their ability is more determinant than the fundamental skills one must perform a specific behaviour (Krueger Jr & Dickson, 1994). Hence, a person's

environment can strengthen their perception of ability and performance (Asimakopoulos et al., 2019). When coupled with DI possibilities, ESE can propel Generation Z entrepreneurs to identify possible courses of action to pursue a particularly innovative idea. It is noted that entrepreneurs with reliable information, networks, and market access can guide their efforts toward innovation (Dimov, 2010). Relying upon DI's resource availability and accessibility, entrepreneurs can understand how much effort should be invested and where to exert effort to realise innovative initiatives. So, Generation Z entrepreneurs with high ESE but little access to resources could leverage DI possibilities into innovation behaviour.

Overall, although self-confidence favours Generation Z entrepreneurs by providing many benefits, we argue that the ESE-innovation relationship is stronger in environments with higher levels of DI. Self-efficacious Generation Z entrepreneurs will be more likely to engage in innovation behaviour in countries with stronger resource access mechanisms provided by DI. Thus, we propose the following hypothesis:

Hypothesis 2 (H2). In the countries with higher levels of DI development, Generation Z entrepreneurs benefit more from their self-efficacy toward innovation than the countries with lower DI.

3.2.2 Moderating the Effect of Opportunity Identification on Innovation

Despite expensive research on the definition, antecedents, and mechanism of OI (Filser et al., 2020; Mary George et al., 2016), there is still scant research on how OI can affect venture outcomes, especially innovation (George & Bock, 2011; Young et al., 2018; Zahra & George, 2002). Research evidence has shown that not all identified opportunities by entrepreneurs lead to innovative behaviour in practice (Snihur & Zott, 2018). Thus, a critical question remains: Why do some but not all identified opportunities result in innovation? As SCT has suggested, for OI to influence innovation, an environmental-oriented mechanism is required (Bandura, 1991, 2015).

During the ongoing process of opportunity identification, individuals devote a significant amount of their time actively and intentionally to scanning the environment for information, leading to perceiving profitable opportunities (Kadile & Biraglia, 2022; Tang et al., 2012). Environments rich in resources (i.e., tangible or intangible) are more fertile for awakening OI capability (Pirhadi et al., 2021). The amount of and access to information provided within the DI framework feeds the entrepreneur's capability toward opportunity recognition (Cuomo et al., 2017). Through interacting with an extensive network of stakeholders, entrepreneurs will be equipped with information that could be translated into ideas, resources, and promising future opportunities (Ardichvili et al., 2003; Chen & Tseng, 2021; Lanivich et al., 2022; Minniti, 2004; Wasdani & Mathew, 2014). Entrepreneurs integrate diverse and novel information achieved from dissimilar fields and different sources into meaningful patterns (Tang et al., 2021). So, DI provides Generation Z entrepreneurs with possibilities that direct them to constant involvement in scanning, searching, monitoring, and detecting to identify business trends such as latent demand, industry evolution, emerging technologies, or new business models that would manifest in seemingly profitable entrepreneurial opportunities (Guo & Jiang, 2020).

However, beyond assisting entrepreneurs in identifying opportunities, DI is a critical enabler in directing identified opportunities to innovation outcomes. Digitisation through facilitating direct communication reduces the cost of knowledge transfer and collaboration (Forman & Van Zeebroeck, 2019; Tajpour et al., 2022). Through boosting interactions with different stakeholders, DI allows entrepreneurs to increase their at-hand resources (Elia et al., 2020; Satalkina & Steiner, 2020), which are essential for innovation (Barasa et al., 2017). Eventually,

DI favours Generation Z entrepreneurs to know how to mobilise network and information practically toward innovation (e.g., in the form of redesigning the current process, innovative use of IT, workflow improvement, change in supply chain new business model or developing new products (Bygstad & Øvrelid, 2020). Relying on DI access-related mechanisms, entrepreneurs' contact and conversation with stakeholders (Nambisan & Zahra, 2016), especially existing and potential customers, investors, suppliers, and potential partners, serve as a source of acquiring complementary resources to transform identified opportunities into tangible innovation behaviour. Hence, DI empowers entrepreneurs in their actions and strategies should be taken to translate OI into innovation (for example, gathering and leveraging resources, capability enhancement, feasibility and desirability assessment, partners' engagements, etc.), developing and introducing the innovation into the market, promoting their brand and, capture the value of identified opportunities (Foss et al., 2013; Ramadani et al., 2022). Through constant interaction with their network proposed by DI's enabler possibilities, Generation Z entrepreneurs not only be able to acquire first-hand information on their opportunity-oriented ideas (e.g., customers' attraction, constructive feedback, complementary or substitute exemplar, industry promising or hostile trends, etc.) but also compensate their shortcomings (e.g., tangible resources especially financial), which are critical to complete the process of innovation originating from opportunities.

With its access-related mechanisms, we propose that DI is an EE that moderates the effect of OI on innovation behaviour. Specifically, we argue that in countries with higher levels of digitalisation, it is more probable that opportunities identified by Generation Z entrepreneurs lead to innovative outcomes. Thus, we propose the following hypothesis:

Hypothesis 3 (H3). In the countries with higher levels of DI development, Generation Z entrepreneurs better translate the identified opportunities to innovation than those with lower DI.

3.2.3 Moderating the Effect of Risk-Taking on Innovation

Extensive research evidence has shown the positive impact of risk-taking on firm development, competitive position, survival, and superior performance (Liu et al., 2019; Stam & Elfring, 2008). However, theoretical findings also vary significantly regarding the relationship between risk-taking and firm performance, especially innovation (Guo & Jiang, 2020). There are two main approaches to determinants of risk-taking. First, personal characteristics such as cognitive schemes and emotions play a role in encouraging more risk-taking behaviours. For example, Traczyk et al. (2015) and Sobkow et al. (2016) suggest that mental imagery plays a critical role in risk-taking. Hence, it is likely that a more positive mental image motivates people to pursue new paths regardless of uncertain outcomes. Second, the perception of reality affects entrepreneurs' risk-taking inclination toward performance (Zaleskiewicz et al., 2020). According to SCT, it can be argued that entrepreneurs' risk-taking willingness to undertake innovative behaviour would shape and accelerate their perception of the fertile environment for entrepreneurship. So, although entrepreneurs' risk-taking willingness relates to innovation (García-Granero et al., 2015), this relationship may be contingent upon the munificence level in the environment in which innovation behaviour is realised (Tang & Tang, 2007).

DI's access-related mechanisms would be able to intensify entrepreneurs' positive perceptions about the surrounding environment. Digital technologies give entrepreneurs an extensive amount of information and vast numbers of networks, which in turn reduce information asymmetries between entrepreneurs and their stakeholders, resulting in knowledge diversity and knowledge sharing (A. Cirillo et al., 2021; Etemad et al., 2010; Pagani & Pardo, 2017). Such a supporting enabler condition lead Generation Z entrepreneurs to undertake innovation

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3 project despite uncertain returns. In essence, empowered by abundant resources stemming from
4 DI's possibilities, Generation Z entrepreneurs will be decisive in achieving their goals and
5 boosting innovation performance. In this way, entrepreneurs can mobilise resources such as
6 knowledge, capital, materials, and emotional support (i.e., mentorship and receiving advice,
7 guidance, and feedback (Ramadani et al., 2021), which could foster their decisions to tackle
8 innovation projects.
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11 Via digital platforms, entrepreneurs can test the feasibility and desirability of their
12 ideas/concepts relying upon various forms of investigation such as preliminary market testing,
13 financial return, and feedback from customers in their social network (i.e., whether the idea is
14 workable, whether the team possess the necessary skills to commercialise it truly and whether
15 it is novel enough to attract potential customers (Lumpkin & Lichtenstein, 2005). This leads
16 risk-taker Generation Z entrepreneurs to try to rethink their strategies, restructure their business
17 models, design new or reorganise their current platforms, target new market segments, establish
18 a new partnership, or expand their operations to foreign markets (Li & Jones, 2019) even with
19 uncertain outcomes (Guo & Jiang, 2020). DI's components (e.g., digital forums, discussion
20 boards, social networks, and platforms) make it feasible for entrepreneurs to integrate partners
21 better, quickly receive their knowledge and information, and reduce the cost of coordination.
22 For example, DI provides more external funding sources for entrepreneurs through
23 accessibility to a wide range of investors, especially via crowd-funding platforms beyond
24 physical structures, and encourages risk-taker entrepreneurs to innovative behaviour. Providing
25 critical knowledge and information on the existence, availability, and applicability of
26 technology solutions in new and emerging markets (Engel et al., 2017; Saadatmand et al.,
27 2017), DI makes it possible for Generation Z entrepreneurs to exploit such awareness to nurture
28 their technical and commercial experience. Interacting with a broad social network of
29 Generation Z entrepreneurs and acquiring additional insights and resources enhance their
30 decision-making and make them able to direct risk-taking willingness to move forward in the
31 process of innovation (Rotefoss & Kolvereid, 2005).
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36 In countries with a high level of DI, the access-related mechanism enables individuals to
37 identify and acquire tangible and intangible resources (Nambisan & Zahra, 2016), provoking
38 individuals' risk-taking willingness to undertake innovation behaviour. In other words, it is
39 more likely to innovate by risk-taker entrepreneurs when the level of the country's DI is higher.
40 Thus, we propose the following hypothesis:
41

42 *Hypothesis 4 (H4). In the countries with higher levels of DI development, Generation Z*
43 *entrepreneurs benefit more from their risk propensity toward innovation than the countries*
44 *with lower DI.*
45

46 *Insert Figure 1 About Here*
47

48 **3 Research Method**

49 **3.1 Data and Sample**

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52 The current research benefits from the data collected by GEM annual surveys from 2015 to
53 2018 and the European Commission's Digital Economy and Society Index (DESI) data. GEM
54 annually conducts two adult population surveys (APS) and national expert surveys (NES).
55 GEM measures the involvement in entrepreneurial activity, and each national team each year
56 chooses to attend the survey or not (self-selection) in the adult population survey. APS collects
57 some data on entrepreneurs' sociodemographic and psychological characteristics and their
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aspirations, including (but not limited to) their opportunity identification, self-efficacy, risk-willingness, and their (the variables of interest in the current research).

DESI is also an annual survey that collects national-level data on society's digitalisation and economy in European countries yearly from 2015 onward. DESI measures the digitalisation of the countries through five indices, all of which are comprised of other sub-indices: connectivity (with sub-dimensions of fixed broadband, mobile broadband, fast broadband, ultrafast broadband, broadband price index), human capital (including advanced skills and development and internet user skills), use of internet services (including, internet use, activities online, and transactions), integration of digital technology (including, business digitalisation and e-commerce), and digital public services (including e-government and e-health).

To match the data of GEM and DESI databases, the authors extracted the data of each survey for 2015-2018 for the following 25 countries: Austria, Belgium, Bulgaria, Czech Republic, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. The inclusion of the countries has been based on the existence of the data (Both GEM and DESI). In a few countries, GEM or DESI data have yet to be available together to be included. This process yielded a sample of 8601 Generation Z entrepreneurs for the statistical analyses.

3.2 Variables and Measures

In the following sections, we briefly describe the variables and their measurements.

Explanatory Variables

- *DI*: Our variable for measuring DI comes from the digital economy and society index (DESI), which is a composite index that the European Commission has operationalised as the weighted average of the five dimensions, namely, connectivity (25%), digital human capital (25%), use of internet services by people (15%), integration of digital technology (20%) and digital public services (15%). DESI scores take the values between 0 and 100 (100 denotes the highest level). Accordingly, the DESI score of each country has been calculated using the following formula by the European Commission: $DESI^1 = Connectivity * 0.25 + Human\ Capital * 0.25 + Use\ of\ Internet * 0.15 + Integration\ of\ Digital\ Technology * 0.2 + Digital\ Public\ Services * 0.15$. DESI scores categorise the countries on a five Likert scale in which countries are categorised as non-digital (23-30), almost non-digital (31-38), moderately digital (39-46), almost digital (47-54), and digital (55 and above). In the current study, DESI scores were logged to reduce the data skewness.
- *Opportunity Identification*: Our data enables the operationalisation of opportunity identification in a question: Will there be a good opportunity for starting a business in

¹ Digital Economy and Society Index, 2019, pp.19

the area where you live in the next six months? The respondent's answers were coded as ONE if they identified an opportunity and 0 if not.

- *Risk-propensity*: Risk propensity has not been directly measured by GEM APS data; however, fear of failure has been measured by asking the respondents if fear of failure prevents them from starting a new business. To operationalise risk-willingness, the data of fear of failure has been reversed. The responses in our data set were coded as 0 if they were risk-averse and one if not.
- *Entrepreneurial Self-efficacy*: indicates whether the individuals think they possess the knowledge, skills, and experience required to start a new business. The responses are coded 1 for self-efficacious and 0 for non-self-efficacious entrepreneurs.

Innovation: Innovation has been measured by GEM data using three questions designed to measure the level of process innovation, product innovation, and competitiveness of the firm offerings.

Product innovation has been measured by asking if all, some, or none of their potential customers consider this product or service new. Similarly, for operationalising process innovation, the firms were asked if the technologies or procedures required for their offerings have been available for less than a year, between one and five years or longer than five years. To operationalise the competitiveness of the products, the firms were asked if many, few or no other businesses are offering the same products or services to the firm's potential customers. The responses were captured for these three dimensions using a three-point scale from 1 to 3 (1 denotes the lowest level).

Our variable of innovation is an index made by taking the average of the scores on the above three items.

Generation Z entrepreneurs: There is no consensus on a specific year as the exact birth year for the entrepreneurs to be categorised as Generation Z. However, there is a consensus on the mid90s-2000 as the birth year range (Kubátová, 2016; Rodriguez et al., 2019; Singh Ghura, 2017; Turner, 2015; Yazici & Arslan Ayazlar, 2021). In the current study, this range has been adopted. To extract a list of the Generation of the entrepreneurs, the authors first pulled the list of entrepreneurs, then asked SPSS to filter the results based on the following formula: (Year of Survey-Age at the time of the survey) \geq 1996. Therefore, the generation Z is operationalised as the cohort of entrepreneurs born in 1996 and afterwards and own a business.

- *Control Variables*

We controlled for entrepreneurs' gender (0 = female, 1 = male), age, education (whether they have achieved higher education), and growth ambition. We controlled for Firm age (the logarithm of firm age), Firm size (the logarithm of the number of employees working for the firm), countries' support for high-growth businesses (from 1 (the lowest) to 5 (the highest)), availability of finance (from 1 to 5), support for youth entrepreneurship (from 1 to 5) and people's ability to start-up (from 1 to 5).

3.3 Empirical Strategy

Multiple regressions were used to address hypotheses for a direct effect of an entrepreneurial mindset. We also measured the cross-level effects (hypotheses H2-H5) by applying hierarchical moderated regressions. Multilevel regressions limit the possibility of Type 1 and

2 errors and better estimate the coefficients (Hoffman et al., 2000). To decrease collinearity between the explanatory variables, the mean-centred values for these variables were calculated before performing the analysis.

4 Results

4.1 Descriptive Results

Table 1 shows a description of the variables and the results of the correlation test. The sample was slightly dominated by male entrepreneurs (59% males and 41% females). Around 43% of our sample have pursued tertiary studies and achieved higher degrees. Some 45 per cent reported that they have identified an opportunity in the environment, 63% are self-efficacious, and 52% are risk-willing. The level of innovation among them stands on an average level (1.62 out of 3). They were operating in countries more than the average of their people having start-up ability. The support for youth entrepreneurship and the institutional support for high-growth entrepreneurship in such countries were higher than average. They had access to formal sources of finance (such as bank loans and venture capital) on average.

Based on Table 1, correlations are primarily insignificant and very low, indicating that multicollinearity is not an issue in this study. The variance inflation factor (VIF) measurement returned coefficients below 1.2, suggesting that co-linearity was not an issue in this study.

Insert Table 1 About Here

4.2 The Results of Hypothesis Testing

The results of the hypothesis tests have been presented in Table 2. The score for R-squared is significant for all models, indicating that each model has unique contributions to explaining the variations in the innovation of Generation Z entrepreneurs. The first model summarises the effects of control variables. The scores for innovation were higher among those with tertiary education involvement ($\beta=.12$, $P<.05$) and who had higher growth ambitions ($\beta=0.15$, $P<.05$). Firm-level variables such as current employment size ($\beta=-.054$, $P<.05$) and firm age ($\beta=-.115$, $P<.05$) were negatively associated with innovation. Amongst the country-level variables controlled, only institutional support for high-growth entrepreneurship (attention to high growth) affected innovation for Generation Z entrepreneurs ($\beta=.062$, $P<.05$).

The second model in Table 2 investigates the effect of explanatory variables: DI, opportunity identification, risk-willingness, and self-efficacy. Based on the second model, innovation was positively associated with opportunity identification ($\beta=.08$, $P<.05$) and risk-willingness ($\beta=.029$, $P<.05$) and were higher amongst self-efficacious entrepreneurs ($\beta=.091$, $P<.05$). These results supported hypotheses H1a, H1b, and H1c.

In the third model in Table 2, the interaction effects are estimated. The results indicated that digitalisation of the economy enhances the impact of self-efficacy ($\beta=.019$, $P<.05$), Risk willingness ($\beta=.035$, $P<.05$) and opportunity identification ($\beta=.015$, $P<.05$) on innovation.

Insert Table 2 About Here

Our analysis generally shows that having an entrepreneurial mindset boosts innovation in firms. More importantly, the socio-cognitive components of an entrepreneurial mindset enhance this effect in digitalised economies (depicted in Figures 2, 3, and 4).

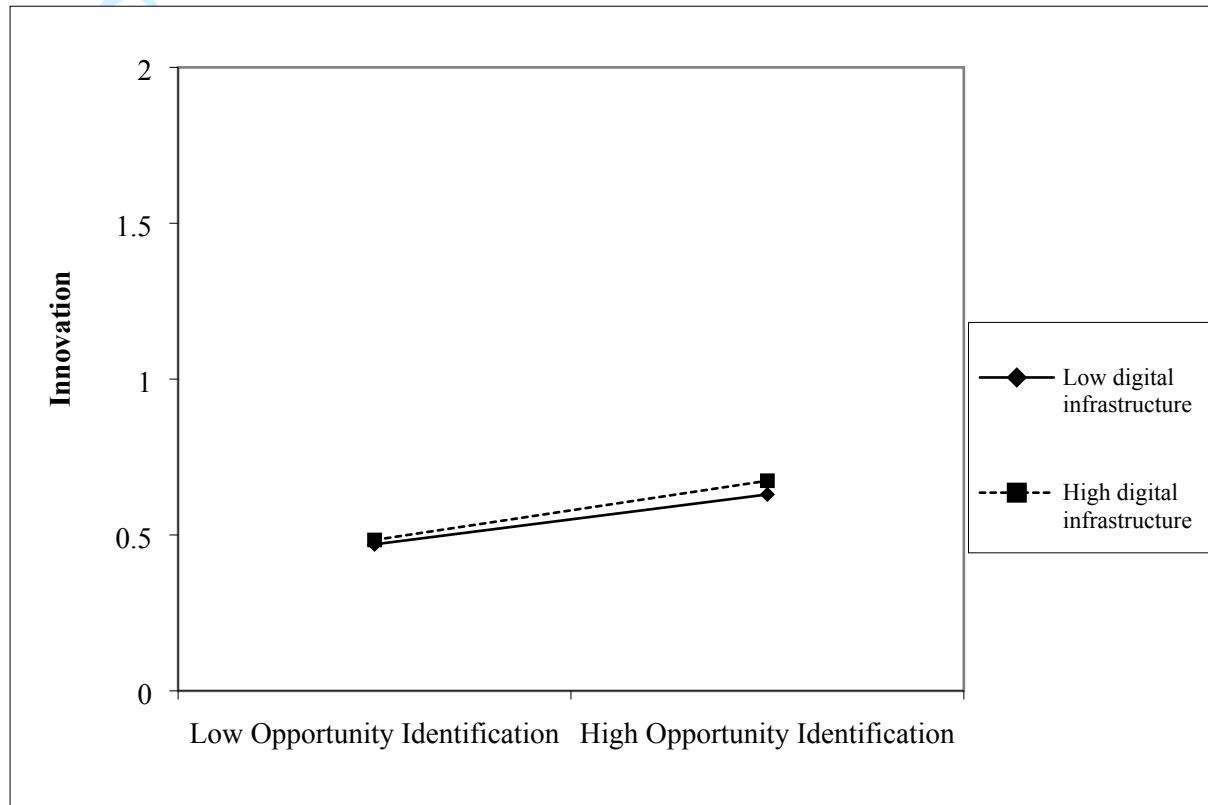


Figure 2. The moderating effect of DI on the relationship between opportunity identification and innovation among Generation Z entrepreneurs (Created by Authors)

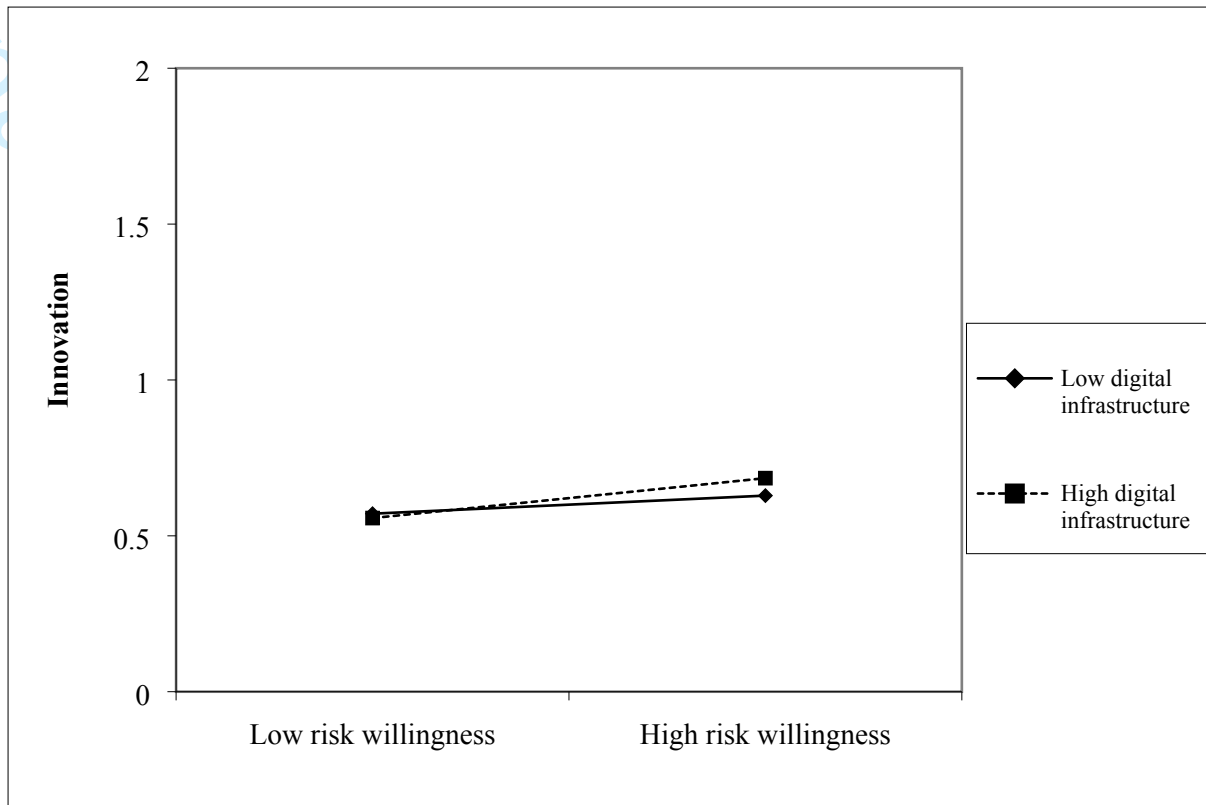


Figure 3. The moderating effect of DI on the relationship between risk-willingness and innovation among Generation Z entrepreneurs (Created by Authors)

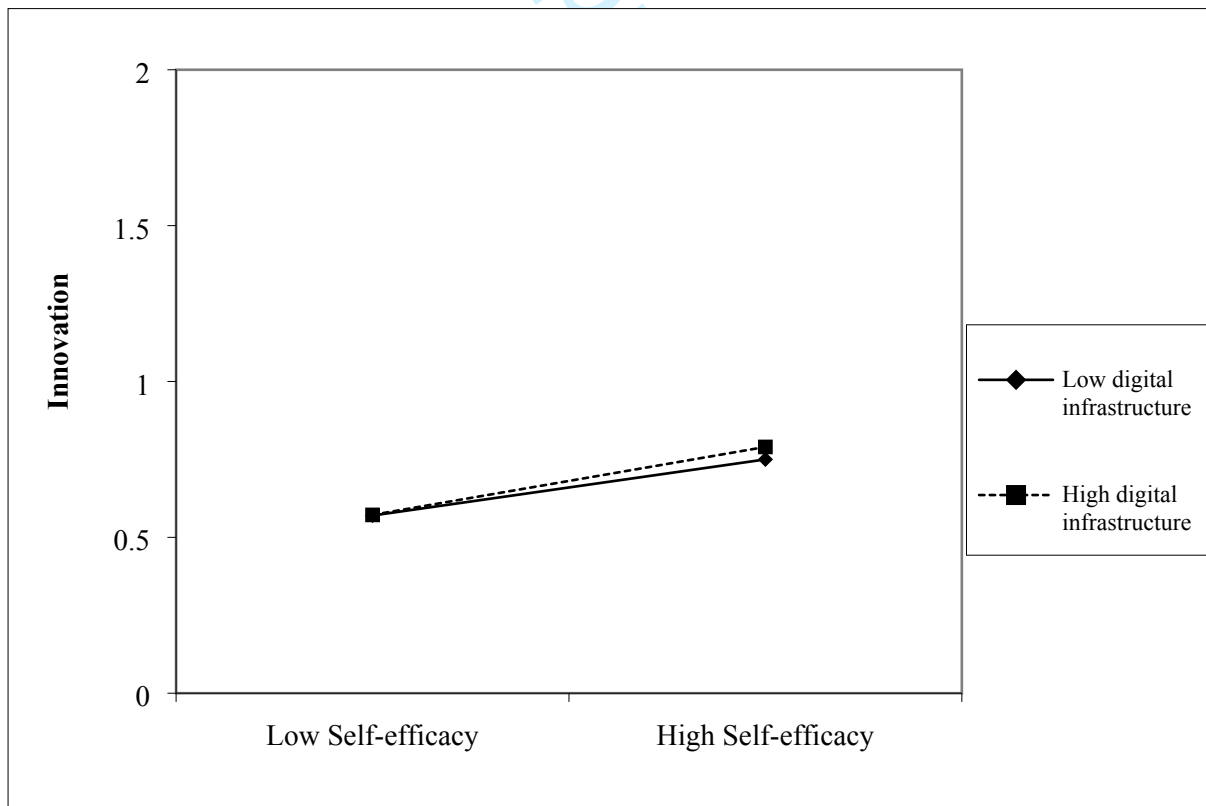


Figure 4. The moderating effect of DI on the relationship between self-efficacy and innovation among Generation Z entrepreneurs (Created by Authors)

4.3 Robustness checks

Two approaches have been followed in this paper to ensure the robustness of the results. First, stepwise, two interaction terms were inserted to see if the coefficients' significance changed. After doing that, the coefficients' significance did not change. As advocated by scholars (Hamaker & Muthén, 2020; Sessions & Stevans, 2006), to avoid the omitted variable bias, several variables at the individual and country levels are inserted in the analyses. Among individual-level explanatory variables, we had household income (Yang et al., 2020), role modelling opportunity (Turro et al., 2020), and entrepreneurial experience (Poblete, 2018). Moreover, since we sampled only 25 countries, the country-level controls were added to see any inconsistency within the results. At the country level, data on culture (Martiarena et al., 2022; Rodríguez-Serrano & Martín-Armario, 2019), availability of finance (Ashourizadeh et al., 2022; Hechavarría & Ingram, 2019), R&D transfer (Amorós et al., 2019), economic freedom (Fuentelsaz et al., 2018), GDP (Vodá et al., 2020), and normative support for entrepreneurship were inserted. There were no inconsistencies in both scenarios (adding individual and country-level variables), indicating that the results are robust and reliable.

Discussion

The current research aimed to understand the interplay of socio-cognitive components of entrepreneurial mindset and innovation and to learn if DI impact can enhance the benefit of cognitions for innovation. The study was conducted on a sample of Generation Z entrepreneurs in Europe. It showed that cognitions (self-efficacy, risk-willingness, and opportunity identification) affect the innovation level in the firms owned or managed by Generation Z entrepreneurs. Reflecting individuals' self-belief in their knowledge and capabilities (Newman et al., 2019), ESE significantly influences their perception of how they accomplish their goals (To et al., 2020). Self-efficacious individuals with higher levels of goal commitment (McGee & Terry, 2022), passion for business development (Cardon & Kirk, 2015), setting higher expectations (Wei et al., 2020), and underestimating difficulties would be able to undertake novel task (Caliendo et al., 2023b) and thereby might be more prone to be innovative (Caliendo et al., 2023b; Nag et al., 2020; Wei et al., 2020). Opportunity identification capabilities equip entrepreneurs with imagination and creativity on the one hand (Gaglio & Katz, 2001) and identifying market gaps (Vedula et al., 2019) on the other hand, through which they would be able to devise new possibilities as the forms of new products/services or new ways of doing things (Dyer et al., 2008; Gaglio, 2018; Park, 2005). In effect, through opportunity identification capability, entrepreneurs can connect and synthesise available information in a different novel way and combine them with their at-hand resources toward developing new business ideas (Kohli & Melville, 2019; Lim & Xavier, 2015). Hence, we can expect that such a capability might result in innovative behaviours (Gielnik et al., 2015; Guo et al., 2017; Hock-Doepgen et al., 2021; Kohli & Melville, 2019; Satalkina & Steiner, 2020). Considering the uncertainty inherent in entrepreneurship (Knight, 1921; Schumpeter, 1934), risk-taking willingness is critical to an entrepreneur's capabilities to take action. Despite uncertain outcomes, risk-taker individuals not only perceive the business environment as more supporting for opportunity recognition (Guo & Jiang, 2020; Zhao et al., 2021) but also incline to allocate their at-hand resources regardless of unknown consequences (Wang & Juan, 2016). Positive assessment of market information leads risk-takers to find new ways of doing things through new opportunities, solutions, and methods (Vora et al., 2012). risk-taking propensity

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3 led individuals to work around obstacles through flexibility, learning from mistakes, and
4 finding new ways of resource combining to achieve an uncertain outcome (Dewett, 2006;
5 Kraus et al., 2019; Meijer, 2015). It is more probable that risk-takers tolerate the uncertainty
6 behind innovation and behave innovatively (Lou et al., 2022; Vassallo et al., 2023). Overall,
7 the results confirm the general wisdom in entrepreneurship that cognitions can increase
8 innovation within the firms. Such a consistent understanding can be seen in the results reported
9 by different researchers (e.g., Ashourizadeh et al., 2014; Newman et al., 2018; Thavorn et al.,
10 2020).

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14 Regarding the enabling mechanisms, we have answered the call for how entrepreneurial
15 cognition influences innovation (McLarty et al., 2023). Our results indicated that the effect of
16 cognitive mechanisms of an entrepreneurial mindset (risk-willingness, self-efficacy, and
17 opportunity identification) on innovation could be enabled by the level of DI development in
18 the societies. This is a novel aspect of the current research. These enablement mechanisms are
19 discussed and justified in the following section:
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23 Generally, Generation Z entrepreneurs are a digitally savvy generation whose daily life is
24 embedded in digital technology (Hinduan et al., 2020). Therefore, digital technology
25 affordances could be essential to understanding their entrepreneurship and, specifically, their
26 innovation journey. Regarding the enabling mechanism of DI on risk propensity and
27 innovation, we can argue about some resource access and experimentation mechanisms (Elia
28 et al., 2020). Generation Z entrepreneurs are a resource-poor generation. They lack the
29 entrepreneurial capital (e.g., human, financial, technological, or business networks) (Pindado
30 et al., 2023; Ruiz-Jiménez et al., 2021) to pursue ambitious entrepreneurial activities such as
31 innovation. DIs can provide this resource-poor yet information-rich generation of
32 entrepreneurs with access to the resources, knowledge, and technical expertise in an affordable
33 and timely manner (V. Cirillo et al., 2021; Pagani & Pardo, 2017) (thanks to removing the
34 geographical and temporal distance between the innovation stakeholders (Nambisan & Zahra,
35 2016)). Moreover, DI gives them an experimentation opportunity to be able to test their
36 offerings or new business models with low operational costs (Kallinikos et al., 2013).
37 Therefore, DIs may limit the cognitive barriers to growth and help the risk-willing Generation
38 Z entrepreneurs to test and try their new ideas and innovate by decreasing the costs associated
39 with risk-taking and experimentation.
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46 Regarding the enabling mechanism of DI on opportunity identification relationship, we may
47 argue that DIs provide knowledge search and recombination facilities to this information-rich
48 generation (V. Cirillo et al., 2021). Moreover, DIs enable access to valuable resources
49 necessary for innovation for this resource-poor generation. These include technical expertise,
50 knowledge, and financial resources (Nambisan & Zahra, 2016). For example, nowadays, digital
51 platforms enable entrepreneurs to crowdfund their innovation activities or perform idea
52 crowdsourcing for innovating. Moreover, entrepreneurs can access technical expertise in open-
53 source communities and benefit from modular layered structures of digital technologies to
54 access the knowledge-sharing dynamics around the firm (Hylving & Schultze, 2020; Yoo et
55 al., 2010). These different and heterogeneous sources of information that have been made
56 available to Generation Z entrepreneurs help them to recombine their knowledge for
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3 uncovering new ways of value offering, introducing new products combined with features and
4 affordances of digital technology, enhancing their innovation processes using a better resource-
5 mobilization possibility provided to them by the digital economy.
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8 Our results found an external enablement role for DIs in the interplay of self-efficacy and
9 innovation. Self-efficacious entrepreneurs are more ambitious to grow (Caliendo et al., 2023a;
10 Petrović & Leković, 2019; Saeedikiya & Aeeni, 2020; Saeedikiya et al., 2017; Saeedikiya,
11 Aeeni, et al., 2021; Saeedikiya, Li, et al., 2021; Verheul & Van Mil, 2011; Wilson et al., 2007)
12 and growth ambitions have been found to affect innovation (Azari et al., 2017; Colclough et
13 al., 2019; Nambisan et al., 2019). DIs may enhance this enablement role by providing access
14 to resources necessary for growth (David-West et al., 2018; Montealegre et al., 2019; Urbinati
15 et al., 2020). Therefore, increased growth aspirations can be actualised in terms of
16 innovativeness. Moreover, self-efficacy can lead to more confidence in innovation. This may
17 occur due to feedback loops created by the affordances of digital technologies in more
18 digitalised societies. This generation of entrepreneurs can create a capstone or initial model of
19 their products and receive fast feedback from the target sector or intended clients. Moreover,
20 information analytics and social media analytics tools are available to track the changes in the
21 market and evaluate market offerings to develop more confidence in their innovations.
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27 **Theoretical Contributions**

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29 This study has several critical contributions to the entrepreneurship literature. Firstly, our study
30 contributes to knowledge accumulation in context-oriented research. We employed the
31 contextualised view to explain that micro-level entrepreneurial outcomes largely depend on the
32 macro context in which individuals behave and act (Wadhvani et al., 2020; Welter, 2011;
33 Zahra et al., 2014). Beyond previous studies focusing on social, institutional, or cultural
34 dimensions, we have focused on a novel and overlooked technological aspect of context named
35 Digital Infrastructure (DI). Specifically, our findings suggest that country-level DI through
36 resource and market access (Nambisan et al., 2019) influences individual-level entrepreneurial
37 outcomes innovation.
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42 Secondly, we answer numerous calls in the entrepreneurship literature scholarly beyond work
43 on “entrepreneurship in context” (Shepherd et al., 2021; Welter et al., 2019) to capture new
44 insights through unfolding the interactive mechanisms between micro and macro-level
45 variables (Boudreaux et al., 2019). Although the role of cognition in entrepreneurial outcomes,
46 including innovation, has been investigated in previous studies (e.g., Marzi et al., 2023; Ni et
47 al., 2022; Raza et al., 2020; Zhou et al., 2021), the underlying mechanism that explains why
48 some cognitively capable entrepreneurs are more prone to be innovative has largely been
49 neglected in the literature (Dew et al., 2015; McLarty et al., 2023). Our study mainly provides
50 new insights into the contextual differences, explaining why, even among entrepreneurs
51 possessing cognitive capabilities, some can benefit their cognition in favour of action. By
52 combining two critical theoretical frameworks, namely SCT (Bandura, 1986a; Wood &
53 Bandura, 1989) and EE (Davidsson et al., 2020; von Briel et al., 2018), we have uncovered the
54 consequences of digitalisation as a contextual enabler on how cognitive capabilities can
55 influence innovative behaviour. Following calls to investigate further this relationship (Dew et
56 al., 2015), we identify the country’s level of digitalisation as the moderator in the link between
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3 cognition and behaviour. We argue that digitalisation is a promising contextual enabler to
4 enable cognitively capable entrepreneurs to innovate better. According to our findings, while
5 possessing some special cognitive capabilities can increase the possibility of innovative
6 behaviour, entrepreneurs in contexts with higher levels of digitalisation can benefit their
7 cognition toward innovation. Applying this insight to entrepreneurship literature, we show that
8 DI is a vital macro-foundation determinant that helps explain differences in the micro-
9 foundation behaviour of entrepreneurs. Beyond using micro-foundation theories to explain
10 entrepreneurs' behaviours and actions, we have improved the exploratory and predictability of
11 the agent-centric approach of SCT (Fisher & Aguinis, 2017). In this way, we answer recent
12 calls to combine the EE framework with agent-centric theories (Davidsson et al., 2022;
13 Kimjeon & Davidsson, 2022).

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15 Finally, to the best of our knowledge, this study is among the first studies that apply the
16 combination of EE framework and SCT to investigate the innovation behaviour of
17 entrepreneurs using a generational perspective and find empirical support for the framework at
18 the European level. That is while the other studies primarily have focused on external enablers
19 of entry to entrepreneurial activities (they have studied potential entrepreneurs) (Cestino
20 Castilla et al., 2023; Chalmers et al., 2021; Davidsson et al., 2018; Nielsen & Hakala, 2023;
21 von Briel et al., 2018). Thus, our study contributes to the scarce literature investigating the
22 interplay of micro and macro dynamism of entrepreneurial outcomes among those newly
23 stepped into the entrepreneurship world, i.e., Gen Z (Hamdi et al., 2022; Zhang & Acs, 2018).

31 **Policy Implications**

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33 The results of this study also provide several practical implications for policymakers who
34 should account for formulating policies aimed at increasing entrepreneurial outcomes. Our
35 findings illustrate the positive aspects of DIs, which means that digitalisation makes cognitively
36 capable Gen Z entrepreneurs more prone to be innovative. In effect, the enablers possibilities
37 of DIs, specifically information creation, knowledge sharing, and resource access, serve as
38 mechanisms through which resource-poor but information-rich Gen Z would be able to behave
39 innovatively. Considering the scant research explaining the influence of digitalisation on
40 entrepreneurial outcomes, policymakers don't know how a country's digital infrastructure can
41 lead to promoting entrepreneurial dynamism. In this way, we believe that our findings have
42 important implications for policymakers who face the challenge of DI management. Our
43 research reveals how DI can stimulate the innovative behaviour of cognitively capable
44 entrepreneurs. Enhancing the country' DI can compensate for such generations' scarce
45 resources and lead them to be more creative. Hence, the government should provide the
46 necessary infrastructure through direct investment or stimulate DI providers to equip the
47 country's digitalisation level and enable Gen Z novice entrepreneurs to overcome resource-
48 oriented obstacles. However, it should be noted that DIs cannot be designed and fostered
49 through centralised, top-down control but should be evolved at least partially through
50 architectural mechanisms that enable more effective solutions, especially in countries with
51 lower levels of DIs (Bygstad & Øvrelid, 2020). Furthermore, despite rapidly growing the
52 tremendous impact of digitalisation on a country's sustainable competitiveness (Muldoon et al,
53 2023) during the recent decade, there are still numerous challenges related to the legal

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3 framework regulating the disposition of digital possibilities and uncertainties concerning their
4 acceptance (Fossen & Sorgner, 2018). So, more importantly, beyond providing financial
5 support, policymakers should improve regulations allowing DIs to emerge, evolve and become
6 widespread. In this way, as suggested by Dabbous et al. (2023), governments and policymakers
7 are urged to design and enforce the appropriate legal and regulatory frameworks related to
8 developing and deploying digital infrastructures.
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13 **Limitations and Recommendations for Future Research**

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15 Like many other studies in entrepreneurship, the current study has some limitations. First, the
16 study has been done at the European level, in which there are some similarities among the
17 countries regarding their level of institutional development. It is recommended to apply the
18 framework to other contexts with more variations in their institutional quality to see and test
19 the variations in the enablement role of DI. It is worth understanding this interplay based on
20 the country's level of institutional distance or level of development. In some countries, even
21 with a high level of DI, the other institutions may play a counterproductive role in accessing
22 and benefiting from their enablement role. A good example may be China, where the DIs and
23 technologies necessary for communication are built. However, internet censorship policies are
24 in practice. Therefore, DIs may not be able to play their enablement role. Alternatively, some
25 countries with higher ranks in democratic policies with low ranks in digital economy may result
26 in high innovation differentials because the free flow of information is the key to actualising
27 the enablement roles of DI. Similarly, our research does not control for the population of
28 Generation Z entrepreneurs in the countries studied. Since ageing is one of the important
29 challenges in some EU countries, our results may be affected by the population of Generation
30 Z individuals in the host countries.
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35 The current research has been done in the context of Europe. European countries generally
36 have a higher level of infrastructural development than many developing or underdeveloped
37 economies. Therefore, while it poses some limitations on the generalizability of the findings in
38 the other context, it also opens an excellent area for comparative study between Europe and
39 other regions worldwide. Moreover, the effectiveness of the institutions supporting productive
40 entrepreneurship or innovation also differs between Europe and other regions. Taking the level
41 of economic freedom as an example, European countries mostly have a high level of economic
42 freedom or institutional support for productive entrepreneurship. Therefore, these regional
43 differences can potentially affect how cognitive competencies benefit innovation in these
44 regions. Even in Europe itself, there are contextual differences between the countries in terms
45 of their digitalisation development and some other institutional factors that may benefit or
46 hinder the benefit of Generation Z entrepreneurs toward innovation. Also, the generation's
47 composition may differ in European countries. Nowadays, ageing is a significant concern for
48 many countries and European ones. Therefore, the overall ratio of Generation Z to the whole
49 population is expectedly low and differs across the countries. Therefore, these results should
50 be interpreted and used with some caution.
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55 Another issue with the current research is how GEM measures and operationalises alertness.
56 Lanivich et al. (2022) have criticised the GEM single-item measure of alertness. They have
57 encouraged future researchers to be cautious when using the GEM alertness measure. While in
58 the current research, we have used the term opportunity identification for what GEM
59 operationalises as alertness, we acknowledge that Lanivich et al. (2022) criticism still holds,
60 and their recommendations should be considered. This is important because these concepts are

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3 sometimes used interchangeably in the context of entrepreneurship research (Mary George et
4 al., 2016), raising some concerns about conceptualisation and operationalisation.
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6 Further, the results of the current study may need to be generalised to other generations, like
7 baby boomers or millennials. Although there are some overlaps in generational characteristics,
8 these generations still differ in their approach to life, technological values, and their adoption
9 of social values related to innovation. For example, regarding the level of technological
10 savviness, exposure to digital technology, and digital skills, there are differences between
11 Generation Z individuals and the rest of the population. While these differences limit the
12 generalizability of the findings to other generations, it opens a debate on the comparability of
13 the results and calls for comparative studies in different generations.
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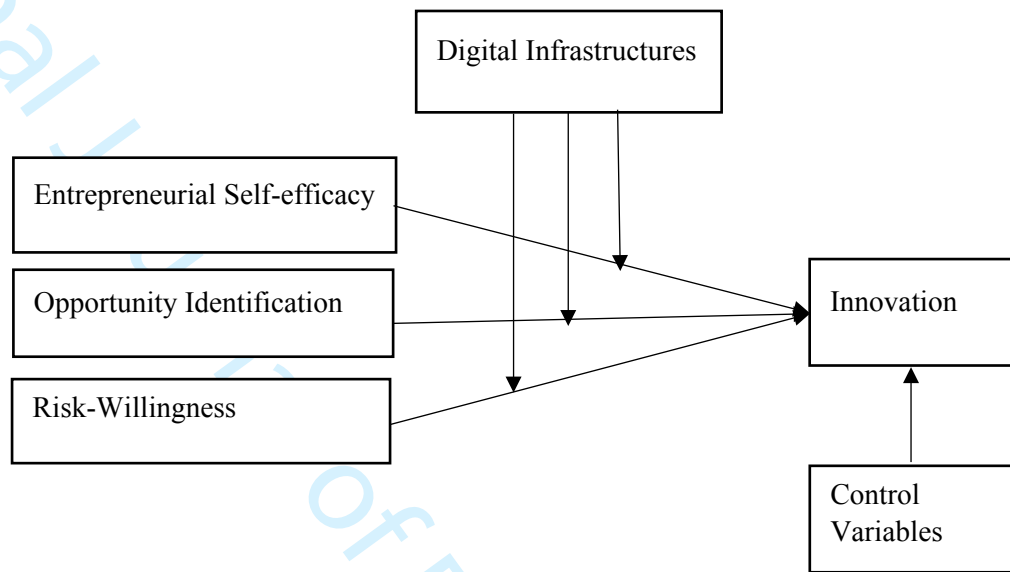


Figure 1. The hypothesised paths (source: authors)

Table 1. Description of the sample and correlation matrix (Source: Created by Authors)

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Innovation	1.66	0.89	1															
2	DI	45	28	.025**	1														
3	Opportunity Identification	0.45	.490	.012*	.039	1													
4	Self-efficacy	0.63	.450	.004*	.026**	.020*	1												
5	Risk-willingness	0.52	0.39	.001	.011	-.082**	-.030	1											
6	Age	21.6	4.15	.029	.044**	.016*	.05**	-.001*	1										
7	Gender (Male)	0.59	.490	.063*	-.158**	-.220**	-.001**	.008	.006	1									
8	Firm age	2.21	.940	-.115*	-0.017	-.064	.006	.015	.039**	.029**	1								
9	Firm Size	2.19	4.92	-.054*	.131*	.029**	.001	.012	.041*	.011	.004	1							
10	Growth Ambition	5.62	4.15	.015*	.103**	.06**	.009*	.012**	.012**	.014	.019	.201	1						
11	Education	0.43	.251	.12*	.231**	.140**	.121*	-.006	.017	.019*	.009*	.024*	.221**	1					
12	Venturing Motivation	0.54	.181	.205	.060	.004	.006	-.001	-.004	.007	.001	.034*	.215*	.217**	1				
13	People's Start-up Ability	2.65	1.48	.021	-.025	.061**	-.001	.007	.009	.016	.010	.008	.014	.201	.228**	1			
14	Youth' Entrepreneurship	2.81	1.04	.006	.128	-.043	.138*	.013	.016	.018	.181	.014	.014	.124*	.0230	.003	1		
15	Support for high-growth ENT.	2.92	.399	.062	.230*	.011	-.010	-.005	-.001	.010	.105	.115	.030	.034*	.032*	.006	.006	1	
16	Availability of finance	2.54	.253	.001	.008	.001	.002	-.003	-.001	.013	.112	.009	.010	.014*	.012*	.003	.001	.003	1

**P<0.01, *P<0.05

Table 2. Innovation Explained by Direct and Moderation Effects for Generation Z Entrepreneurs
(Source: Created by Authors).

Predictors	DV: Innovation					
	Step 1		Step 2		Step 3	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Age	-.069**	.129**	-.061**	.141**	-.060**	.161**
Gender (Male)	.080**		.079**		.079**	
Education	.081**		.072**		.092**	
Firm age	-.007		-.005		-.001	
Firm Size	-.087**		-.086**		.016	
Growth Ambition	0.09**		.136**		.136**	
People's Start-up Ability	.009		.007		.000	
Youth' Entrepreneurship	.008		.008		.001	
Attention to high growth	.018**		.014**		.006*	
Availability of finance	.007		.009		.008	
DI (H3)			.021		.019	
Opportunity-Identification (H1a)			.080**		.065	
Self-Efficacy (H1b)			.091**		.011	
Risk-willingness (H1c)			.029**		.018**	
DI * Opportunity Identification (H2)					.015*	
DI *Self-Efficacy (H3)					.019**	
DI *Risk-willingness (H4)					.035**	

Notes: *P<0.05; **P<0.01

Source: Created by Authors

Dear Editor in Chief/ Associate Editor/ Subject Area Editor/Guest Editors/Reviewers

We greatly appreciate your valuable and constructive feedback regarding the final draft of our paper. We have diligently incorporated the comments received during the first and second review rounds to enhance the quality of the paper.

During the initial revision, the authors made earnest efforts to address the feedback provided by both reviewers. However, an error occurred when the corresponding author merged all the corrections made by different co-authors on different parts of the paper and therefore uploaded an incorrect version of the paper, inadvertently overlooking certain comments, particularly those from the second reviewer. This situation arose due to the collaborative nature of our work, with various authors contributing their input for each review. Unfortunately, the version uploaded on the website was incorrect, and some revisions recommended by the second reviewer were not fully addressed in that version. We deeply regret any inconvenience this may have caused and sincerely apologise for this oversight.

We sincerely thank the second reviewer, who generously provided additional comments, and the editorial team of IJEER, who granted us the opportunity to undertake another revision. We can understand the second reviewer's comments on the revised version about the inconsistency of our claims in the response letter and the revisions performed on the paper because of the above-detailed mistake. We do apologise!

A summary of our responses and the implemented corrections can be found in the accompanying table. Should further clarification be required, please get in touch with the corresponding author.

**Warm regards,
The Authors**

Reviewer 1- Second Round Comments		
Congratulations on the fine revision!	Thank you. The authors are thankful to you for the very nice comments on the revised version of the paper.	
Reviewer 2 - First Round Comments		
Dear Authors, Thank you for submitting your manuscript to IJEER. You tackle an interesting and relevant topic; your paper is generally well-written. However, I have identified a few shortcomings that you should address to improve the quality of your work. Most are minor and can easily be resolved, but I have one main concern requiring further reflection and effort, as indicated in my comments below. I begin with my main concern and then proceed with the minor issues that I present sequentially, section by section.	First, the authors thank the reviewer for providing constructive comments that substantially helped us improve the paper. The authors have revised the paper based on the reviewers' recommendations. In the next rows, you will find the responses to each comment and associated corrections. The revisions are highlighted in red and blue colour for the first and second revisions provided by the reviewer, respectively.	
	We can understand the primary concern of the reviewer. The adoption of the term "alertness" in our study was	See the literature review, please.

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27</p> <p>MAIN CONCERN</p> <p>You refer to one of the key constructs in your study as entrepreneurial alertness. However, I do not consider the single-item GEM measure that you use in your analysis (“will there be a good opportunity for starting a business in the area where you live in the next six months?”) as an adequate measure of alertness. Although Lanivich et al. (2022), who you cite in your paper, acknowledge that other studies have used this single-item GEM measure to capture alertness, they also note that “using this lone GEM item to determine alertness is questionable” and that “Studies using this single-item measure as a proxy for alertness should be interpreted with caution” (p. 1170). I am in agreement with these authors in this respect, and regard your measure of alertness to be the main shortcoming of your study.</p>	<p>based on prior research using GEM data published in leading entrepreneurship journals such as JBV, SBE, and ET&P.</p> <p>For example, Boudreaux, C. J., Nikolaev, B. N., & Klein, P. (2019). Socio-cognitive traits and entrepreneurship: The moderating role of economic institutions. <i>Journal of Business Venturing</i>, 34(1), 178-196.</p> <p>However, as we highlighted Lanivich et al.’s criticism on the GEM alertness scale, <u>we accept that the reviewer’s comment is relevant and important.</u> Accordingly, as suggested, we have adopted the term <i>opportunity identification</i> for what GEM has operationalized as “finding an opportunity in the environment for starting a business in the next 6 months”.</p> <p>Based on that, new sections have been added to the literature review parts.</p> <p>A new section also has been added to the limitation part of the paper.</p>	<p>See the limitation part, please.</p>
<p>28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46</p> <p>In order to rectify this issue, I suggest you refrain from claiming that you are measuring alertness and, instead, refer to a construct that is more aligned with what the GEM item actually captures. This could be something more generic, such as opportunity awareness / recognition / identification. Your choice should ideally be informed by other academic research that has utilized this GEM variable.</p> <p>Whatever you choose, you will need to revise the sections and hypotheses where you refer to alertness, and ultimately still acknowledge as a limitation the fact that this is a single-item measure.</p>	<p>Thank you for the recommendations on the terminology and the study’s limitations. For the terminology, we adopted opportunity identification as it is well-explained in the entrepreneurship literature and supported by the existing theory.</p> <p>We updated all the paper parts and used the literature that utilised “opportunity identification.”</p> <p>The limitation of using single-item alertness measures have been highlighted in the limitation part.</p>	

<p>1 ABSTRACT</p> <p>2 • The sub-section on ‘Design/methodology/approach’ in your structured</p> <p>3 Abstract should specify that your study uses secondary data derived from</p> <p>4 GEM and DESI.</p> <p>5 • The following refers to your results and should be moved to the</p> <p>6 ‘Findings’ sub-section of the abstract: “showed that socio-cognitive</p> <p>7 components of entrepreneurial mindset (self-efficacy, risk propensity,</p> <p>8 opportunity alertness) affect innovation among generation Z entrepreneurs”.</p> <p>9 • What does IS in the ‘Originality’ sub-section refer to?</p>	<p>We have added the use of GEM and DESI data to our</p> <p>abstract.</p> <p>The IS refers to information systems. This also has been</p> <p>added to the abstract part.</p>	
<p>11 INTRODUCTION</p> <p>12 You begin with a good Introduction that sets the stage for your study by</p> <p>13 highlighting the relevance of your research topic and the literature gap you</p> <p>14 are addressing. However, the following require clarification:</p> <p>15 • Kindly provide your operational definition of “Generation Z</p> <p>16 entrepreneurs”. This should define both “Generation Z” and “entrepreneurs”,</p> <p>17 and should be supported by appropriate literature.</p> <p>18 • You claim that Generation Z entrepreneurs are “a resource-poor yet an</p> <p>19 information rich generation of entrepreneurs”. Kindly provide a brief</p> <p>20 explanation of why / in what ways they are resource-poor and information-</p> <p>21 rich, citing appropriate literature.</p> <p>22 • As currently formulated, your RQ elicits a Y/N answer and is</p> <p>23 grammatically incorrect: “Does digital infrastructure plays an enabler</p> <p>24 role...”. It would be more appropriate to ask, for example, “To what extent</p> <p>25 does infrastructure play an enabler role...”.</p> <p>26 • You should specify in your Introduction (p. 2, lines 40-41) that your</p> <p>27 study makes use of secondary data derived from the GEM and DESI</p> <p>28 databases.</p> <p>29 • Your claim that “the existing research on external enabler frameworks</p> <p>30 has studied potential entrepreneurs in which the researchers have been</p> <p>31 interested in the enabler role of external factors on entry to entrepreneurial</p> <p>32 activities” requires references to the literature.</p>	<p>Thank you. A definition of Generation Z entrepreneurs</p> <p>has been proposed in the introduction—a cohort of</p> <p>individuals born in 1996 and onward and own a</p> <p>business.</p> <p>A new section has been added to the paper to highlight</p> <p>the theoretical foundations of this definition and to</p> <p>discuss its compatibility with the criteria for the</p> <p>conceptual definitions.</p> <p>The above-mentioned section has added arguments on</p> <p>how Generation Z entrepreneurs can be a resource-poor</p> <p>yet information-rich generation.</p> <p>The research question has been corrected.</p> <p>The use of GEM and DESI data has been acknowledged</p> <p>in the introduction part (highlighted in red).</p> <p>The references have been added (highlighted in red).</p>	<p>See the part:</p> <p>Generation Z as</p> <p>Entrepreneurs.</p> <p>Please see the</p> <p>definition in the</p> <p>introduction</p> <p>highlighted by</p> <p>red colour.</p>
<p>36 THEORETICAL FOUNDATIONS</p> <p>37 This is an important section, but it is rather brief. Perhaps it could be</p> <p>38 integrated with the next section?</p> <p>39</p> <p>40 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT</p> <p>41 Your literature review provides a good foundation for your study, and your</p> <p>42</p>	<p>To highlight the overarching theoretical framework, we</p> <p>vere inevitably present the theoretical foundations as</p> <p>separate sections. In the current version, two other parts</p> <p>have been added to this section: Generation Z as</p> <p>entrepreneurs and study context.</p>	

<p>1 hypotheses are largely well-developed and based on sound arguments. 2 Besides my concern with your reference to entrepreneurial alertness as I 3 outlined above, the following require revision:</p> <ul style="list-style-type: none"> 4 • You refer to entrepreneurial orientation in your paragraph on risk-taking 5 (p. 4, line 55), but this is generally a firm-level construct. This sentence does 6 not add much value to your paper, so I suggest you delete it. 7 • H1a refers to “perception of opportunity”. It seems to me that this 8 should be entrepreneurial self-efficacy. 9 • The sub-headings regarding the moderation hypotheses (3.2.1, 3.2.2, 10 3.3.3) are not too clear. 11 • Please include a figure to illustrate your conceptual framework and 12 hypotheses. 	<p>Concerning risk-taking and alertness, the arguments from the EO have been removed. The current version of the paper has updated the literature review.</p> <p>Thank you very much for letting us know about the mistake in the hypothesis. We have corrected it.</p> <p>We have modified the headings and subheadings.</p> <p>The proposed research model has been presented in the current version.</p>	
<p>15 RESEARCH METHOD</p> <ul style="list-style-type: none"> 16 • What were your criteria and rationale for selecting the 25 countries you 17 included in your study? 18 • Your definition and operationalization of Generation Z is clear, but how 19 were entrepreneurs defined and operationalized? Were they, e.g., owner- 20 managers of their own businesses? Were their businesses of any age and size? 	<p>The research team has tried to include as many countries as possible to represent the whole of Europe and to ensure maximum variations in the level of digital infrastructure development in these countries. Please also note that the inclusion of the countries has been based on the existence of the data (Both GEM and DESI). In a few countries, GEM or DESI data have yet to be available together to be included.</p> <p>Generation Z entrepreneurs have been operationalised as those individuals born after 1995 (definition of Generation Z) who own businesses (Definition of Entrepreneurs by GEM). This definition captures any business of any size and stage of development (nascent, new, and established).</p>	
<p>35 RESULTS</p> <ul style="list-style-type: none"> 36 • Why was innovation not included your correlation analysis? It would be 37 interesting to see how this correlates with the other variables in your research. 38 • On p. 13 line 19, you state that “growth expectations were positively 39 associated with...”. Do you mean that “innovation was positively associated 40 with...”? 	<p>Thank you for this comment. Innovation has been included in the correlation analysis table in the current version of the paper.</p> <p>Yes, we meant innovation. Thanks for helping us to correct this mistake.</p>	

<p>DISCUSSION</p> <ul style="list-style-type: none"> In your discussion it would be helpful to remind readers which hypotheses were / not supported, and to offer your reflections / reasons for these findings on the basis of the literature you reviewed. On p. 19 lines 18-19, you state that “Such a consistent understanding can be seen in the results reported by different researchers”. Please provide references to appropriate literature in support of this claim. Your contributions need to be much better articulated. You do not mention practical recommendations/implications. These should be included in your revised version of the manuscript. 	<p>The reflections on the hypotheses have been provided in the discussion.</p> <p>The enablement mechanisms (moderations) and cognitive mechanisms of Generation Z entrepreneurs’ innovation have been discussed in the discussion parts. As suggested by the reviewer, the reasons and justifications have been provided and supported by the literature.</p> <p>The references have been provided.</p> <p>Theoretical contributions have been modified.</p> <p>Practical Implications have been inserted.</p>	
<p>GENERAL COMMENTS</p> <ul style="list-style-type: none"> Meticulous proofreading (ideally by a native English speaker) is required as there are various instances of typographical and/or grammatical errors. Please be consistent in your use of abbreviations (e.g., Gen Z) and acronyms (e.g., IS, DI). Ideally, these should be stated in full the first time they are mentioned, and in shortened form thereafter. <p>I hope you will find my feedback useful and wish you all the best for further developing your paper.</p>	<p>The current version of the paper has been checked in terms of cohesion, consistency, grammar and proof.</p> <p>Abbreviations double checked and corrected.</p> <p>The authors are very pleased to have such a great reviewer who was willing to invest his/her valuable time to improve the quality of the paper.</p>	
<p>Additional Questions:</p> <p>1. Originality: Does the paper contain new and significant information adequate to justify publication?: Yes, this paper identifies and addresses a relevant gap in the entrepreneurship literature, thereby providing an original contribution to knowledge.</p>	<p>Thank you.</p>	
<p>2. Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: Yes (to the first question), on the whole. However, there are a few unsupported statements (which I identify in my detailed comments to the author/s below), and I suggest that the sections on entrepreneurial alertness are replaced with</p>	<p>The current version applies this comment. Please see the previous explanations on opportunity identification.</p> <p>These comments are all addressed in previous sections. The section for opportunity alertness was changed and replaced. The authors have eliminated the unnecessary</p>	

<p>1 literature related to a construct that is more aligned with what the single-item 2 GEM measure actually captures (which is not alertness, to me).</p>	<p>use of alertness in the other parts of the paper, as suggested by the reviewer.</p>	
<p>3 3. Methodology: Is the paper's argument built on an appropriate base of 4 theory, concepts, or other ideas? Has the research or equivalent intellectual 5 work on which the paper is based been well designed? Are the methods 6 employed appropriate?: Yes, except for 'entrepreneurial alertness', which I do 7 not consider as adequately captured by the single-item GEM variable used. 8 Moreover, an operational definition for Gen Z entrepreneurs is required.</p>	<p>The operational definition of Generation Z entrepreneurs has been added to the methodology, The definition has been added to the introduction and “Generation Z as entrepreneurs” sections.</p>	
<p>9 4. Results: Are results presented clearly and analysed appropriately? Do the 10 conclusions adequately tie together the other elements of the paper?: Yes, but 11 why is Innovativeness not included in the correlation analysis?</p>	<p>We have included innovativeness in the current version.</p>	
<p>12 5. Implications for research, practice and/or society: Does the paper identify 13 clearly any implications for research, practice and/or society? Does the paper 14 bridge the gap between theory and practice? How can the research be used in 15 practice (economic and commercial impact), in teaching, to influence public 16 policy, in research (contributing to the body of knowledge)? What is the 17 impact upon society (influencing public attitudes, affecting quality of 18 life)? Are these implications consistent with the findings and conclusions of 19 the paper?: Some future research avenues are proposed at the end of the 20 paper, but there is no mention of practical recommendations / implications. 21 These should be included in the revised version of the manuscript.</p>	<p>Practical implications have been inserted.</p>	
<p>22 6. Quality of Communication: Does the paper clearly express its case, 23 measured against the technical language of the field and the expected 24 knowledge of the journal's readership? Has attention been paid to the clarity 25 of expression and readability, such as sentence structure, jargon use, 26 acronyms, etc. Does the title of the paper adequately reflect the key 27 concepts/ideas/topics addressed?: The paper is largely well-written in 28 appropriate academic language, and the main arguments are logically 29 developed and clearly articulated. However, meticulous proof-reading 30 (ideally by a native English speaker) is required as there are various instances 31 of typographical and/or grammatical errors. Moreover, use of abbreviations 32 (e.g., Gen Z) and acronyms (e.g., IS, DI) should be more consistent 33 throughout the paper. Ideally, they should be stated in full the first time they 34 are mentioned, and in shortened form thereafter.</p>	<p>The proofreading has been done in the current version. Abbreviations have been checked and corrected.</p>	

Reviewer 2- Second Round Comments		
Comment	Response	
<p>Dear Authors, Thank you for resubmitting your paper to IJEER. Your response letter suggests that you have done a good job in addressing my main concerns. However, upon inspection of your R.1 manuscript, I was disappointed to discover that many of your claimed changes have not really been carried out in the paper.</p>	<p>Dear Reviewer, we are so sorry for the inconvenience created. A wrong file was uploaded in the submission system. This situation arose due to the collaborative nature of our work, with various authors contributing their input for the reviews provided by each reviewer. However, the corresponding author failed to upload the correct version incorporating all the amendments done by all co-authors. However, we were lucky to receive more comments from you on our first revisions to improve the paper.</p> <p>Sorry for that again.</p>	
<p>I agree with your use of the term opportunity identification, but note that you still refer extensively to opportunity alertness in your tables, figures and text, including Section 3.2 - Variables and Measures.</p>	<p>We corrected this in all text.</p>	
<p>You claim that "As recommended by the reviewer, we have acknowledged that this measure is a single-item measure and highlighted the benefits of using multi-item measures". However, I cannot find where you have acknowledged this – is it in the Limitations section?</p>	<p>Sorry, this occurred due to our mistake in uploading the wrong version of the article. Now it's corrected.</p>	
<p>You state that "A definition of Generation Z entrepreneurs has been proposed in the introduction". You do indeed provide a good definition of Generation Z entrepreneurs. However, this is in the Theoretical Foundations section, not the Introduction. I think this is still too late.</p>	<p>We have provided a definition of Generation Z entrepreneurs in the introduction as well.</p>	

1 2 3 4 5 6 7	- You elaborate a little in the paper on how Generation Z entrepreneurs are resource-poor and information-rich, but you do not cite any (let alone, appropriate) literature to support your claims.	The citations have now been added. See the blue-coloured paragraph in the "Generation Z as Entrepreneurs" section.	
8 9 10 11 12	You state that "the research question has been corrected", but it appears the same to me in the revised manuscript.	Sorry, this occurred due to our mistake in uploading the wrong version of the article. Now it's corrected.	
13 14 15 16	Similarly, you claim that "The use of GEM and DESI data has been acknowledged in the introduction part", but I can still cannot find it in the Introduction.	Sorry, this occurred due to our mistake in uploading the wrong version of the article. Now it's corrected.	
17 18 19 20 21	You state that the Theoretical Implications have been modified, but I see little (if any) difference from the previous version.	Sorry, this occurred due to our mistake in uploading the wrong version of the article. Now it's corrected.	
22 23 24 25 26 27	Your response to my query regarding the criteria and rationale for selecting the 25 countries is satisfactory. However, this needs to be stated in the paper's Method for the readers' benefit.	This also has been stated in the method (highlighted with the blue colour in the revised file).	
28 29 30 31 32 33 34	Your operationalization of Generation Z is also satisfactory, however, as noted above this has only been specified in the Theoretical Foundations section. The corresponding sub-section in the Methods section should be updated accordingly.	The method has been updated, and an operationalisation of Generation Z entrepreneurs has been presented. See the red and blue highlights, please.	See the red and blue highlights in the method section, please.
35 36 37 38 39 40 41 42	. Originality: Does the paper contain new and significant information adequate to justify publication?: This is an interesting and relevant study on the whole, but the authors have not been meticulous enough in their amendments to justify publication.	Again, so sorry for that!	
43 44 45 46	Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: Parts of the manuscript, including the literature review, have been updated to refer to opportunity identification. However, alertness is still mentioned extensively in various sections of the paper.	The use of the term alertness in the paper has been eliminated. See the whole version of the revised paper please.	

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3	Methodology: Is the paper's argument built on an appropriate base of	Sorry, this occurred due to our mistake in uploading the	
4	theory, concepts, or other ideas? Has the research or equivalent	wrong version of the article. Now it's corrected.	
5	intellectual work on which the paper is based been well designed? Are		
6	the methods employed appropriate?: Yes, but the details provided in the		
7	authors' response letter should be included in the paper's Method		
8	section.		
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10			
11	Results: Are results presented clearly and analysed appropriately? Do the	Sorry, this occurred due to our mistake in uploading the	
12	conclusions adequately tie together the other elements of the paper?: In	wrong version of the article. Now it's corrected.	
13	general, yes, but the terminology has not been updated from opportunity		
14	alertness to opportunity identification.		
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17	Implications for research, practice and/or society: Does the paper identify	Thanks	
18	clearly any implications for research, practice and/or society? Does the		
19	paper bridge the gap between theory and practice? How can the research		
20	be used in practice (economic and commercial impact), in teaching, to		
21	influence public policy, in research (contributing to the body of		
22	knowledge)? What is the impact upon society (influencing public		
23	attitudes, affecting quality of life)? Are these implications consistent with		
24	the findings and conclusions of the paper?: Yes		
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30	6. Quality of Communication: Does the paper clearly express its case,	Thank you.	
31	measured against the technical language of the field and the expected		
32	knowledge of the journal's readership? Has attention been paid to the		
33	clarity of expression and readability, such as sentence structure, jargon		
34	use, acronyms, etc. Does the title of the paper adequately reflect the key		
35	concepts/ideas/topics addressed?: Yes		
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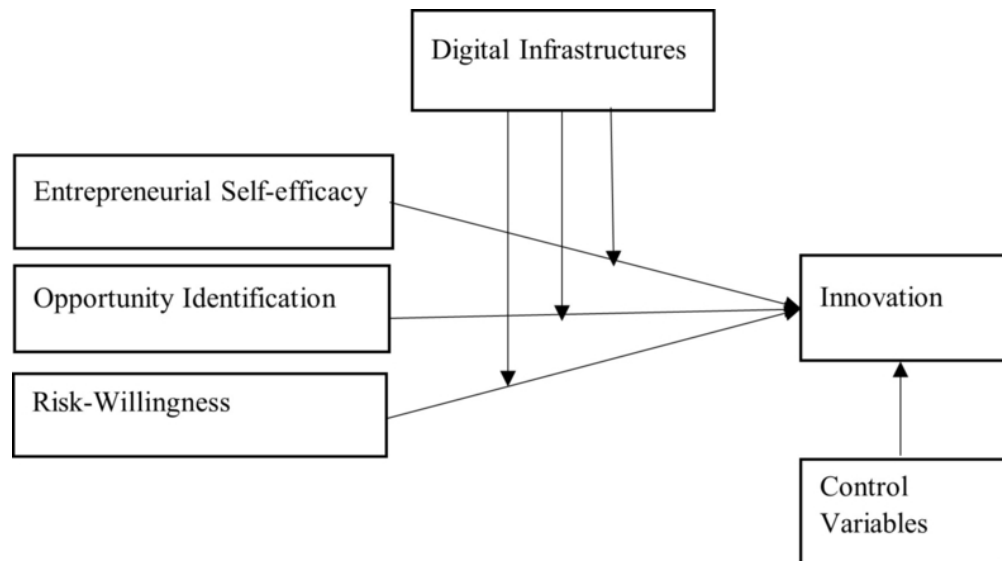
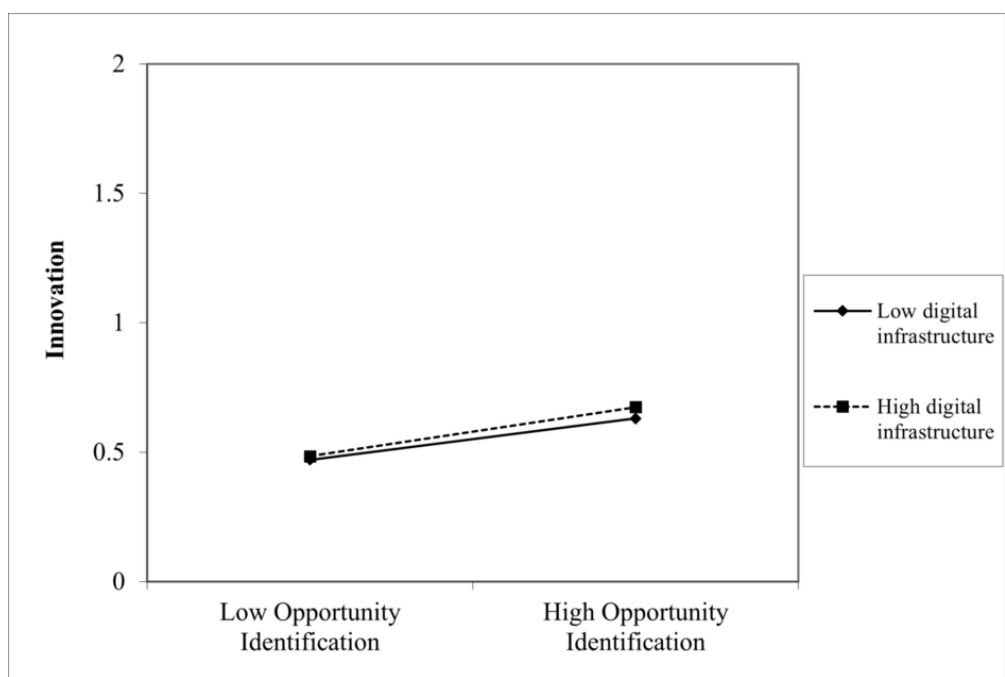


Figure 1. The hypothesised paths

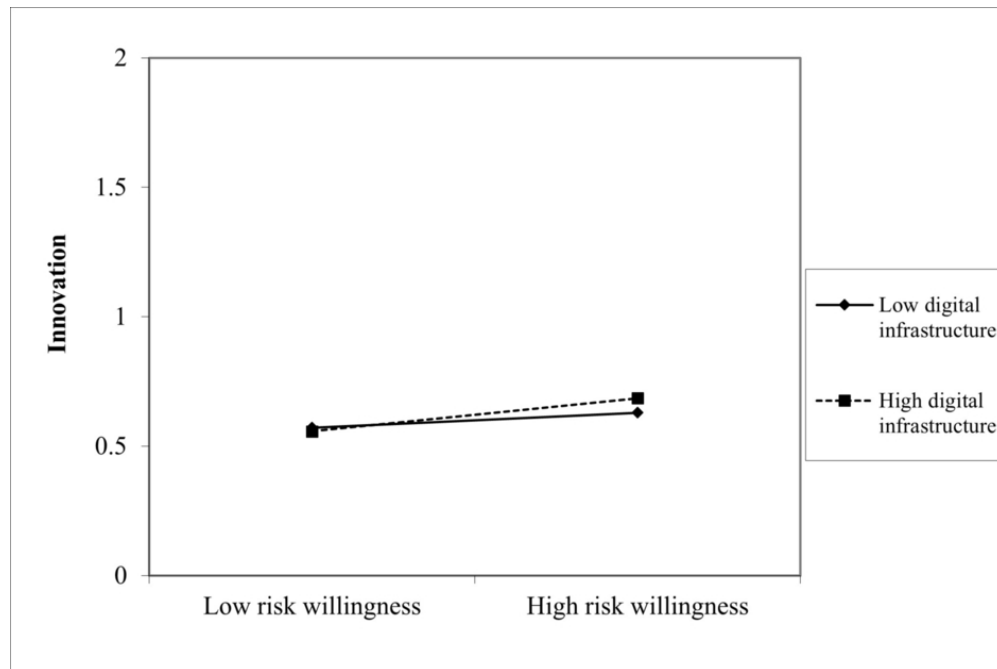
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The moderating effect of DI on the relationship between opportunity identification and innovation among Generation Z entrepreneurs

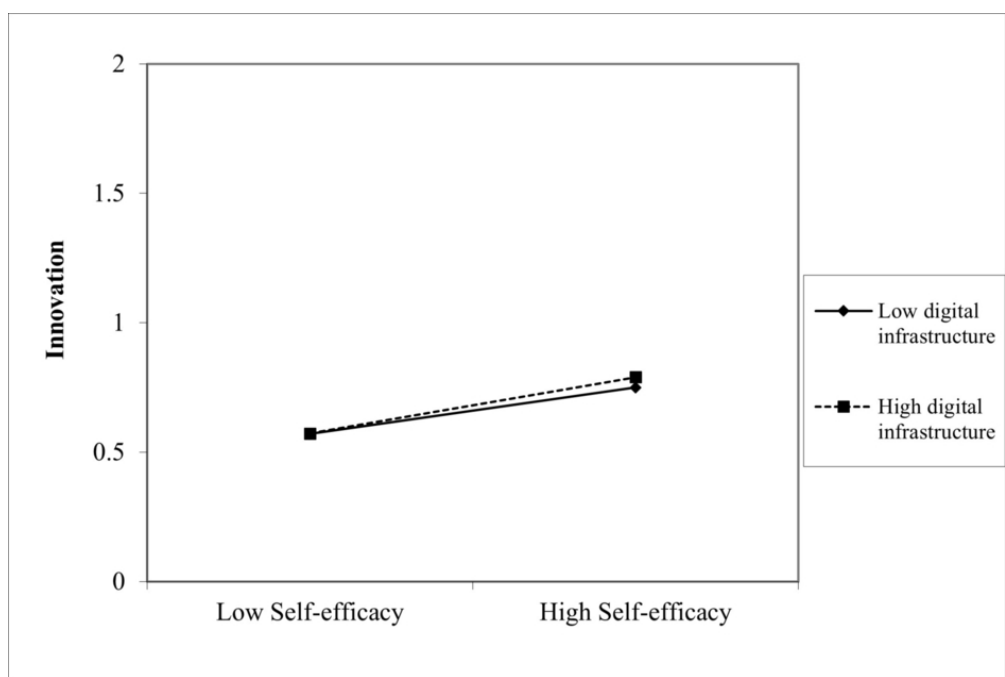
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The moderating effect of DI on the relationship between risk-willingness and innovation among Generation Z entrepreneurs

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The moderating effect of DI on the relationship between self-efficacy and innovation among Generation Z entrepreneurs

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Table 1. Description of the sample and correlation matrix (Source: Created by Authors)

**P<0.01, *P<0.05

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Innovation	1.66	0.89	1															
2	DI	45	28	.025*	1														
3	Opportunity Identification	0.45	.490	.012*	.039	1													
4	Self-efficacy	0.63	.450	.004*	.026*	.020*	1												
5	Risk-willingness	0.52	0.39	.001	.011	-	-.030	1											
6	Age	21.6	4.15	.029	.044*	.016*	.05**	-	1										
7	Gender (Male)	0.59	.490	.063*	-	-	-	.008	.006	1									
8	Firm age	2.21	.940	-	-	-.064	.006	.015	.039*	.029*	1								
9	Firm Size	2.19	4.92	-	.131*	.029*	.001	.012	.041*	.011	.004	1							
10	Growth Ambition	5.62	4.15	.015*	.103*	.06**	.009*	.012*	.012*	.014	.019	.201	1						
11	Education	0.43	.251	.12*	.231*	.140*	.121*	-.006	.017	.019*	.009	.024	.221*	1					
12	Venturing Motivation	0.54	.181	.205	.060	.004	.006	-.001	-.004	.007	.001	.034	.215*	.217*	1				
13	People's Start-up Ability	2.65	1.48	.021	-.025	.061*	-.001	.007	.009	.016	.010	.008	.014	.201	.228*	1			
14	Youth Entrepreneurship	2.81	1.04	.006	.128	-.043	.138*	.013	.016	.018	.181	.014	.014	.124*	.023	.003	1		
15	Support for high-growth ENT.	2.92	.399	.062	.230*	.011	-.010	-.005	-.001	.010	.105	.115	.030	.034*	.032*	.006	.006	1	
16	Availability of finance	2.54	.253	.001	.008	.001	.002	-.003	-.001	.013	.112	.009	.010	.014*	.012*	.003	.001	.003	1

Table 2. Innovation Explained by Direct and Moderation Effects for Generation Z Entrepreneurs (Source: Created by Authors).

Predictors	DV: Innovation					
	Step 1		Step 2		Step 3	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Age	-.069**	.129**	-.061**	.141**	-.060**	.161**
Gender (Male)	.080**		.079**		.079**	
Education	.081**		.072**		.092**	
Firm age	-.007		-.005		-.001	
Firm Size	-.087**		-.086**		.016	
Growth Ambition	0.09**		.136**		.136**	
People's Start-up Ability	.009		.007		.000	
Youth' Entrepreneurship	.008		.008		.001	
Attention to high growth	.018**		.014**		.006*	
Availability of finance	.007		.009		.008	
DI (H3)			.021		.019	
Opportunity-Identification (H1a)			.080**		.065	
Self-Efficacy (H1b)			.091**		.011	
Risk-willingness (H1c)			.029**		.018**	
DI * Opportunity Identification (H2)					.015*	
DI *Self-Efficacy (H3)					.019**	
DI *Risk-willingness (H4)					.035**	

Notes: *P<0.05; **P<0.01

Source: Created by Authors