Technostress in entrepreneurship: Focus on entrepreneurs in the developing world

Abstract

Purpose – This study analyzes technostress in African entrepreneurship. It advances contextualized theoretical explanations of technostress depicting its impact on entrepreneurs who excessively consume digital technology in Africa. The study also describes how research linking transactional benefits to digital technology has created an imbalanced literature that ignores technostress and well–being in African entrepreneurship.

Design/methodology/approach – Considering the study's theoretical explanations derived at the technostress–entrepreneurship–wellbeing nexus, structural equation modeling (SEM) was deemed appropriate. Unlike qualitative–based methods, SEM experiments on 643 observations of early–stage African entrepreneurs in South Africa enabled robust statistical interpretations of their social settings. Thus, strengthening our analysis and focus on the interplay between the variables of technostress, including overload, invasion, complexity, and uncertainty, and their impact on entrepreneurship intentions defined through perceived behavior control, entrepreneurship passion, and digital self–efficacy.

Findings – SEM experiments on these African entrepreneurs revealed technostress dimensions of overload, invasion, complexity, and uncertainty as moderators of their entrepreneurial actions encompassing perceived behaviour control and entrepreneurship passion in connection with their entrepreneurial intentions. The results also suggested that perceived behaviour control, entrepreneurship passion, and the digital self–efficacy of these entrepreneurs influenced their entrepreneurial intentions.

Originality/Novelty – The novelty of this study lies in its theoretical explanations derived at the technostress–entrepreneurship–wellbeing nexus. This conceptual overlay elevates the interpretations of the findings of this study beyond the averages in entrepreneurship and information technology (IT) research. Specifically, it increases their inferential value by revealing subtle and hard to dictate social interactions inherent in how African entrepreneurs consume and are impacted by technology as they pursue their entrepreneurial endeavors.

Research implications – Besides inspiring more studies on technostress and well–being in varied entrepreneurial contexts, this research also initiates debate on policy and social reforms geared toward entrepreneurs considered vulnerable to excessive digital technology consumption.

Keywords: African entrepreneurship, technostress, perceived behavior control, entrepreneurship passion, digital self–efficacy, entrepreneurial intentions

1. Introduction

The advent of digital technology has attracted the attention of many people, not least business communities (Elia, 2020). Its application has presented these business communities with numerous operational benefits, including but not limited to cost savings, efficiency, product innovations, and process innovations (Nambisan, 2017; van Briel *et al.,* 2018). Researchers and commentators acknowledge that contemporary businesses have not only exploited these operational gains (Cuthbertson and Furseth, 2022; Prescott, 2012; World Bank, 2023), but also embraced them in such a way that digital technology has become central to how they formulate their competitive strategies (Leão and da Silva, 2021; Neumeyer and Santos, 2022).

However, and although research identifies dozens of transactional benefits attributable to digital technology in business (see Abed *et al.,* 2015; Asongu and Nwachukwu, 2018; Barbosa *et al.,* 2022), more work remains to be done on the issues of technostress (Brod, 1984), especially in varied entrepreneurial contexts including Africa (cf., Pearson, 2017). Technostress is a term we use in this study to describe mental and physical problems affecting the well–being of individuals who excessively consume digital technology (Ayyagari *et al.*, 2011; Singh *et al.,* 2022) for entrepreneurship purposes (Orrensalo *et al.,* 2022). Consistent with this conceptualization of the flipside of digital technology in entrepreneurship (also see Simba *et al.,* 2024; Thurik *et al.,* 2024), this study uses a rarely studied entrepreneurial context of Africa to advance new theoretical explanations depicting the impact of technostress on the behaviors of early–stage African entrepreneurs.

Considering that entrepreneurship is used as the means to an end across many parts of the African continent (Nguimkeu and Okou, 2022; Weber *et al.,* 2022), it is conceivable that the boundaries delineating reasonable or excessive consumption of digital technology across the continent can be fuzzy. Prior research suggests several other reasons, including lack of knowledge about its side effects, limited digital technology expertise, and lack of guidance on its moderate consumption, especially for early–stage entrepreneurs in Africa as potential causes of many digital technology usage hurdles (cf., Ajide and Osinubi, 2023; Simba *et al.,* 2024). Thus, and because of widespread reliance on digital technology in business, efforts to investigate its potential side effects, like technostress, have become an important health and well–being issue in entrepreneurship (cf., Simba *et al.,* 2024). In light of that, this study develops and draws upon a comprehensive technostress–entrepreneurship–well being analysis and uses the following question to guide its inquiry: *How do mechanisms underlying technostress influence the entrepreneurial intentions and well–being of African entrepreneurs in the early phases of their entrepreneurship journey?*

Based on this integrated technostress in African entrepreneurship question, this study contributes to IT research and the entrepreneurship field in several ways. First, our comprehensive technostress–entrepreneurship–wellbeing analysis juxtaposed against entrepreneurial intentions, as depicted in the theory of planned behavior (cf., Ajzen, 2012; Jeyaraj *et al.,* 2023), extends research to incorporate mental health and wellbeing from the perspective of an early–stage entrepreneur in an African scenario

(cf., Simba *et al.,* 2024). Arguably, this integrated approach accounts for the actions and behaviors of early–stage African entrepreneurs and the factors surrounding their consumption of digital technology in their endeavour (actions) to sustain their livelihoods. Thus, and as with the theory of planned behavior, we build on the assumption that intention is a significant predictor of behavior, while intention itself is a function of behavioral beliefs that link the given behavior to certain outcomes (Kautonen *et al.,* 2011). Therefore, and based on such assumptions, the phenomenon we explore contributes rich and penetrating technostress and African entrepreneurship insights that are otherwise unaccounted for in the extant literature (cf., Stephan, 2018). Admittedly, by accounting for such phenomena, we contribute new theoretical explanations detailing IT–based issues and the flip side of digital technology in African entrepreneurship. The novelty of such an approach to research lies in how it engenders theorizations integrating technostress, well–being, and entrepreneurship in a rarely studied African digital space.

Second, this unique conceptual overlay of technostress, well–being, and African entrepreneurship fosters and contributes to an innovative conceptual framework that engenders explanations situating an African entrepreneurship phenomenon, research questions, theories, and findings in their natural settings (cf., Zahra *et al.,* 2014). Essentially, these theoretical explanations reveal subtle and hard to dictate social interactions inherent in how African entrepreneurs consume and are impacted by technology as they pursue their entrepreneurial endeavors. Arguably, this phenomenon–theory interface generates and contributes thick and unique descriptions

entrepreneurship researchers risk missing out on when they resort to using universal Western theoretical frameworks (see Simba, 2024; Wickert *et al.,* 2024). The idea of developing theory using a developing world scenario responds to recent research calls (e.g., Bruton *et al.,* 2022; Morris *et al.,* 2023; Simba *et al.,* 2024) that have advocated for the importance of using indigenous knowledge to motivate contextual theorizations in research. Thus, this study engenders dialogical scholarly conversation with context (cf., Hamann *et al.,* 2020; Newbert *et al.,* 2022).

Third, these situated contextual perspectives and theorizations have implications. They present scholars with alternative theoretical avenues for future studies. Also, the understanding of the effects of technostress can be instructive for policy institutions that must develop pathways for supporting early–stage entrepreneurship (cf., Matthess and Kunkel, 2020). Their reforms can deliver ways of alleviating the effects of technostress, especially in contexts where digital technology usage is not accompanied by a best practice "playbook".

2. Theoretical background

Technostress first appeared in the works of a clinical psychologist Craig Brod in which it was broadly perceived as a modern disease triggered by one's inability to deal with information and communication technologies (ICT) in a healthy manner (Brod, 1984). Since its appearance in Brod's work, technostress has been largely observed as a factor affecting employee productivity (Chandra *et al.,* 2019), innovation (Maier *et al.,* 2019), and causing employee exhaustion (Singh *et al.,* 2022)

leading to poor job outcomes (Srivastava *et al.,* 2015). Research elsewhere categorizes technostress using five main dimensions, including techno–overload, invasion, complexity, insecurity, and uncertainty (Tarafdar *et al.,* 2007; Thurik *et al.,* 2024).

Within this research stream, multiple causes of technology–induced stress including the lack of technological competence and expertise (Akhtari *et al.,* 2013), computer anxiety, which is the feeling of being unable to execute a computer–based task (Wang *et al.,* 2008), ineptness, or IT illiteracy (Doronina, 1995) have been mentioned. Such technostress paralysis has been identified in research as the main factor that often leads to unfavorable psychological well–being outcomes for many people (Asad *et al.,* 2023; Thurik et al., 2024). Its wider impact has severe economic and social implications for entrepreneurship (Wiklund *et al.,* 2019). For example, it weakens the constructive actions entrepreneurs leverage to create job opportunities for others and produce essential goods and services (Srivastava *et al.,* 2015; Valta *et al.,* 2024). Research also shows that technology stressors trigger mental health problems for entrepreneurs, causing their productivity to suffer (OECD, 2017), yet the businesses they establish have economic and social implications across many global regions (Ning, 2021).

While prior scholarly works generally acknowledge the disruptive nature of technostress, research that focuses on its specific impact on entrepreneurs in varied contexts rarely features in mainstream entrepreneurship and IT research (see Simba *et al.,* 2024). Yet, there is ample research that describes the impact of technostress and

its resulting pressures and complexities on employees (see Atanasoff and Venable, 2017; Bunjak *et al.,* 2021; Califf *et al.,* 2020; Tarafdar *et al.,* 2007; Tarafdar *et al.,* 2015) creating an imbalance in the entrepreneurship and information technology literature. Accordingly, research efforts to develop an understanding of the impact of technology–induced stress on African entrepreneurs do not only help to advance a technostress–entrepreneurship–wellbeing nexus in African entrepreneurship (see Simba *et al.,* 2024), but also contextualize theory building in research (see Morris *et al.,* 2023; Wickert *et al.,* 2024). Thus, engendering theoretical perspectives that intersect technostress, wellbeing, and entrepreneurship in some way (cf., Pathak, 2021).

3. Hypothesis development

To increase the precision of the theoretical explanations at the technostress–entrepreneurship–wellbeing nexus in an African digital space, we draw and extend the tenets of the theory of planned behavior (Ajzen, 1991). Specifically, we develop an overlay of its constructs of perceived behavioral control (PBC) and entrepreneurship passion (EP) in connection with entrepreneurial intentions (EIs) and digital technology. Originating from social psychology, the theory of planned behavior is premised on the assumption that intention is a significant predictor of behavior, and that intention itself is a function of behavioral beliefs that link a given behavior to certain outcomes (Ajzen, 1991; Kautonen *et al.,* 2011).

Accordingly, and by drawing on the tenets of the theory of planned behavior, this study advances understanding of human behavior and psychology in entrepreneurial contexts that rarely feature in mainstream research (cf., Simba *et al.,* 2024). It increases our understanding of the personality traits and social attitudes of entrepreneurs in contexts like Africa especially the continent's understudied digital space. Consistent with this logic, the first three hypotheses elaborate on how the entrepreneurial intentions of African entrepreneurs at the early stage of their entrepreneurial journey have a direct positive relationship with their perceived behavioral control, entrepreneurial passion, and digital self–efficacy. Following that, the last three hypotheses focus on the mechanisms underlying technostress to illustrate how it moderates the link between entrepreneurial intentions and perceived behavioral control, as well as entrepreneurial passion.

As previously explained, the hypotheses for this research draw on a conceptual overlay of technostress and entrepreneurship factors associated with aspiring entrepreneurs in Africa. They were deliberately designed to motivate theoretical explanations at the intersection of technostress, well–being, and African entrepreneurship concepts. By grounding them in theory and the context of Africa, we were able to account for both linear and moderated relationships of the elements that shape how early–stage African entrepreneurs engage with technology. Crucially, the theoretical mapping established through these hypotheses forms the basis of a technostress–entrepreneurship–wellbeing framework. This was an important step in this research. It underpinned the process of visually grouping and identifying

theoretical relationships for our empirical tests.

3.1 Perceived behavior control and entrepreneurial intentions relationship

Research that focuses on the theory of planned behavior recognizes that perceived behavior control improves the entrepreneurial intentions of those individuals who are motivated to start a new venture (Ajzen, 1991; Amos and Alex, 2014; Nkwei *et al.,* 2023). As a concept, perceived behavior control describes an individual's perception of the presence or absence of resources and opportunities to engage in a particular behavior (Ajzen and Madden, 1986). Studies that have focused on digital technology have used perceived behavior control to elaborate the behavior–intention nexus (Zolait, 2014). As an example, Benson *et al.* (2022) studied 54 African countries and found that technology adoption enabled entrepreneurial behavior resulting in increased new venture creation.

Likewise, Ajide and Osinubi (2023) studied 20 African countries and confirmed that the availability and use of digital technology in Africa induced business creation behavior. Similarly, Zaremohzzabieh *et al.'s* (2016) multivariate study identified that youth entrepreneurs perceived that deploying ICT for entrepreneurship purposes would accelerate their ability to establish new enterprises. In this instance, there is a hint that entrepreneurial behavior rests on anticipated outcomes (Fellnhofer, 2017). Thus, entrepreneurial behavior is best predicted by entrepreneurial intentions to engage in business activity in a given context (Abubakre *et al.,* 2022; Ajzen, 1998; Youssef *et al.,* 2021). In some ways, such intentions are formed by attitudes, social

norms, and perceived behavioral control.

In line with research showing a behavior–entrepreneurial intentions connection, it is conceivable that the interplay of attitude, social norms, and behavior in African entrepreneurship plays a role in influencing the intentions of African entrepreneurs to pursue entrepreneurship (cf., Jones *et al.,* 2018; Nkwei *et al.,* 2023). Moreover, and given that these African entrepreneurs are at the early stages of their journeys, such attitudes, norms, and behaviors have the potential to enable them some degree of control over performance in terms of their entrepreneurial intentions/behavior (Ajzen, 2002; Brännback *et al.,* 2018; Liñán and Chen, 2009). To that end, we contend that:

H1: *There is a positive relationship between perceived behavior control and entrepreneurial intentions of early–stage African entrepreneurs.*

3.2 Entrepreneurship passion and entrepreneurial intentions

Research suggests that passion is a key aspect of entrepreneurship, and it plays a decisive role in the business creation process and its outcomes (Huyghe *et al.,* 2016). The study of entrepreneurship passion in the formation of entrepreneurial intentions provides a theoretical understanding of the variations in the intensity of passion with which individuals engage in related entrepreneurship activities (Brod, 1984; Karimi, 2020). In some ways, entrepreneurship passion defines "...consciously accessible intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful for the self–identity of the entrepreneur"

(Cardon *et al.,* 2009, p.515).

Taking this into perspective, it is conceivable that passion in entrepreneurship is among one of the most essential ingredients of entrepreneurial motivation and success in African entrepreneurship (cf., Hartmann and Herb, 2015). Thus, and regardless of the complexities of the African business environment (Simba *et al.,* 2023), existing entrepreneurship studies hint that entrepreneurship passion motivates entrepreneurs to recognize opportunities and create new businesses (Neneh, 2022; Nkwei *et al.,* 2023). In that regard, it ameliorates their (entrepreneurs) intentions to undertake entrepreneurship. Accordingly, this study theorizes that:

H2: *Entrepreneurship passion has a positive effect on the entrepreneurial intentions of early–stage African entrepreneurs.*

3.3 Digital self–efficacy and entrepreneurial intentions

Entrepreneurship research explains how self–efficacy increases the likelihood of entrepreneurially minded individuals becoming business owners (Gielnik *et al.,* 2020; McGee *et al.,* 2009). In other words, self–efficacy gives them the confidence to go on and establish a business venture (Zhao, 2005). Competently applying digital technologies has become a critical skill for most areas of life, including education, work, and social life (Busulwa *et al.,* 2022; Jeyaraj *et al.,* 2023; Kim and Glassman, 2013; Ulfert–Blank and Schmidt, 2022). Entrepreneurship studies categorize digital self–efficacy as a competence entrepreneurs deploy to exploit ICT systems to achieve

their entrepreneurship goals (Oberländer *et al.,* 2020). Similarly, recent research on entrepreneurial intentions (e.g., Letsoalo and Rankhumise, 2020; Neneh, 2022; Nkwei *et al.,* 2023; van der Westhuizen and Goyayi, 2020) suggest that confidence in using digital technology increases the desire for early–stage entrepreneurs in Africa to start, launch, and run a business venture. In view of this level of consensus in the literature, the following hypothesis is presented:

H3: *There is a positive relationship between early–stage African entrepreneurs' digital self–efficacy and their desire to engage in entrepreneurship.*

3.4 The moderating effects of technostress

While previous hypotheses (1, 2, and 3) elaborated on the linear relationships involving perceived behavior control, entrepreneurship passion, and digital self–efficacy with entrepreneurial intentions (Ajzen, 2002), the following hypotheses center on the moderating effects of technostress. Research suggests that excessively applying technology either at work or in business brings various other unintended outcomes for the users (see Hang *et al.,* 2022; Hill *et al.,* 2015). In the context of entrepreneurship in Africa where technology is perceived as a potent tool for dealing with poverty (Lechman and Popowska, 2022), the understanding of how much of its consumption is detrimental to one's health or well–being is very limited (see Ajide and Osinubi, 2023). As such, hypotheses 4, 5, and 6 seek to theorize the effects of technostress among early–stage African entrepreneurs.

Although research on entrepreneurial intentions suggests a direct association between perceived behavioral control and entrepreneurial intentions (Liñán *et al.,* 2011), in the African context, the degree of control over performance in connection with entrepreneurial intentions/behaviors that early–stage African entrepreneurs might have is highly likely to succumb to the need for intensive entrepreneurial activity for their survival and sustainability (Nguimkeu and Okou, 2022). Based on this assessment, it is plausible to claim that the combination of need, usage, and the anticipated benefits of digital technology can lead to its exceedingly high consumption (cf., Weber *et al.,* 2022). Consequentially, problems that include an overlay of technostress–induced issues, comprising technology overload, anxiety, and addiction tendencies (Ayyagari *et al.,* 2011; Brod, 1984) can have an impact on an early–stage entrepreneur's control over their entrepreneurial behaviors. In this scenario where the antecedents of technostress dominate the actions of the entrepreneurs, the link between perceived behavior control and entrepreneurial intentions is attenuated. To that end, this study theorizes that:

H4: *Technostress moderates the relationship between the perceived behavior control and entrepreneurial intentions of early–stage African entrepreneurs.*

Given that digital technologies have become ubiquitous and exert an impervious influence on entrepreneurs and their activities (Neumeyer and Santos, 2022), existing understanding of their side effects on entrepreneurial behavior and actions in varied

contexts is yet to advance (cf., Mash *et al.,* 2022). Thus, focusing on the impact of technostress on individuals who have a passion for entrepreneurship, especially in Africa can advance the understanding of well–being in entrepreneurship (cf., Stephan, 2018; Stephan *et al.,* 2023; Wiklund *et al.,* 2019). Such research efforts are important in that they can aid the understanding of the underlying technostress mechanisms of overload, invasion, complexity, and uncertainty (Ayyagari *et al.,* 2011; Harris *et al.,* 2022) in African entrepreneurship. Research suggests that these technostress antecedents have a negative relationship with wellbeing outcomes (Chandra *et al.,* 2019; Choi and Lim, 2016; Hang *et al.,* 2022; Karr–Wisniewski and Lu, 2010). Although digital technology has benefits in entrepreneurship (Soluk *et al.*, 2021), it is likely that it can also influence entrepreneurial behaviors, passion, and intentions in some way (see Elia *et al.,* 2020). On that basis, the following hypothesis is presented:

H5: *Technostress moderates the relationship between entrepreneurship passion and entrepreneurial behavior of early–stage African entrepreneurs.*

Self–efficacy is a term that has its origins in psychology. Adler's (1927) concept of "mastery motivation" emphasized the need to strive for competence in dealing with one's world. Similarly, Smith (1968) described the mastery motivation concept in the context of competent self. Within that discourse, Foote and Cottrell (1955) focused on interpersonal competence, while Deci (1975) concentrated on intrinsic motivation in terms of the needs for self–determination and competence. The emphasis in all these

conceptualizations was on the idea of being competent to achieve a desired outcome (Gecas, 1989). Thus, and building upon this understanding, it is possible that one can be tempted to draw a direct connection between digital self–efficacy and entrepreneurial intentions in African entrepreneurship. However, for early–stage African entrepreneurs who may be competent in using ICT platforms but lack guidance on how to use them safely, their physical and mental wellbeing maybe at serious risk (cf., Ajide and Osinubi, 2023; Asongu and Nwachukwu, 2018). Hence this study advances that the excessive use of digital technology (knowingly or unknowingly) attenuates the digital self–efficacy and entrepreneurial intentions link. To that end, the following hypothesis is presented:

H6: *Technostress moderates the relationship between digital self–efficacy and entrepreneurial intentions of early–stage African entrepreneurs.*

3.5 Conceptual framework

Based on the theorizations and arguments advanced through our hypotheses, Figure 1 offers a visual representation illustrating the moderating effects of technostress on the entrepreneurial intentions of early–stage entrepreneurs. The connectivity and interactions of the variables exhibited in Figure 1 form the basis for our statistical manipulations presented in our findings thereafter.

–Insert Figure 1 about here–

4. Methodology

4.1 Sample description

To identify a suitable postgraduate student population to study, this research used an online Raosoft sample size calculator. Using the basic principles of this sampling technique, significance levels were set at 95%, a margin of error of 5%, and a sample distribution of 50% on a total population of 1,112,439 students enrolled with South Africa's public higher education institutions (HEIs). This process generated a sample size of 385. To increase the response rate, a decision to double the sample size was reached.

This involved distributing an additional 700 questionnaires to identified graduate students. Consequently, a response rate of 93% was achieved. That is, 651 completed questionnaires were returned with 643 of them in a usable condition. We categorized the responses from our target graduate student population by region, and they spread across the following South African regions: Gauteng (494=76.8%), KwaZulu–Natal (83=12.9%), Eastern Cape (20=3.1%), Limpopo (18=2.8%), Mpumalanga (10=1.6%) and Western Cape (9=1.4%).

4.2 Measures

For this research project, we developed our hypotheses using five key concepts: perceived behavior control, entrepreneurship passion, digital efficacy, technostress, and entrepreneurial intentions (Ajzen, 2002, 2012). As part of that process, we also studied existing scholarly works to pinpoint four related constructs of technostress

comprising overload, invasion, complexity, and uncertainty (Ayyagari *et al.,* 2011; Choi *et al.,* 2016; Tarafdar *et al.,* 2007; Thurik *et al.,* 2024). The survey tool employed to gather our data was designed around these constructs and borrowed only the most credible questions from prior research. The next section elaborates on how each of these elements was measured.

4.3 Convergent validity

To ensure the measurements were accurate, we investigated their convergent validity. This is an evaluation process designed to check if a particular measurement is consistent with other methods that are theoretically supposed to evaluate the same thing. Two statistical methods—factor analysis and the average variance extracted (AVE)—were used to confirm this type of validity. Factor analysis helped us understand whether the questions used in our tool aligned with questions from other tools measuring the same units. Good convergent validity is confirmed when the questions align well. AVE, on the other hand, helped us understand the variation represented by our questions as opposed to errors in measurement. A value above 0.5 in AVE confirmed that the validity was sufficiently robust. The findings from evaluations of construct consistency and convergent validity, as well as any required modifications, are summarized in Table 1 below.

4.4 Reliability

The research assessed the reliability of the constructs mentioned above by focusing on their temporal stability, cross–instrument consistency, and applicability to diverse groups. This ensured that the measurements derived from various items assessing the same construct were harmonious, allowing for a meaningful interpretation of our data. Reliability serves as a cornerstone for credible measurements, ensuring that the scores obtained genuinely represent the construct under study rather than merely reflecting random fluctuations. This research used the technique of internal consistency reliability to evaluate the steadfastness of these constructs. Specifically, the Cronbach's alpha co–efficient was the chosen metric to assess how well the items within each construct are interrelated. A co–efficient value of at least 0.7 is considered a benchmark for dependable measurement. Table 1 illustrates various metrics including factor loadings, the Cronbach's alpha values, and the Average Variance Extracted (AVE) scores.

Items with low factor loadings, falling below 0.5, were eliminated as a way of refining the assessment of specific latent variables or constructs. By removing these less–relevant items, composite scores were then calculated using the remaining indicators, thereby providing a more accurate representation of the constructs being examined. After conducting factor analysis, we observed that all questions linked to the five main constructs presented above had factor loadings greater than 0.7, well above the commonly accepted minimum of 0.5. This indicates a robust correlation between the questions and the underlying concepts they aim to assess.

Furthermore, the Cronbach's alpha values for all constructs show a commendable degree of internal consistency among the items in each set, with scores exceeding 0.77 (as shown in Table 1). As for the structure of the study, the independent variables under consideration are: perceived behavior control, entrepreneurial passion, digital efficacy, and technostress. These are examined in relation to the dependent variable, which focuses on entrepreneurial intentions.

–Insert Table1 about here–

4.5 Discriminant validity

Discriminant validity measures the extent to which a specific latent variable or construct is distinct from other such variables (Taherdoost, 2016). Based on the criteria set by Fornell and Larcker in 1981, the square root of the Average Variance Extracted (AVE) should exceed the coefficients of correlation between constructs. To evaluate this aspect of validity, this study compared the correlations between each pair of constructs to the square root of their respective AVEs. If the correlation exceeds the square root of the AVE, it often raises concerns about the discriminant validity between the constructs involved. Table 2 supports the absence of any discriminant validity issues among the constructs.

–Insert Table2 about here–

4.6 Data analysis

To evaluate our hypotheses, we employed Structural Equation Modelling (SEM) using Smart PLS4 software. As noted by Ramlall (2017), SEM offers a robust and flexible framework for designing, estimating, and evaluating theoretical models with the aim of explaining the maximum variance. This technique is particularly useful for assessing the interconnected relationships between the variables outlined in our conceptual model presented in Figure 1. More specifically, we decided to apply SEM as our primary analytical tool for several reasons. First, SEM offered us unique capabilities that enabled us to simultaneously estimate multiple and interrelated dependence relationships. Its ability to do so was essential in enabling us to produce more precise analyses of the effects of the moderator variables within our model. Furthermore, by using SEM, we were able to investigate how our moderators affected our dependent variable concurrently, providing a holistic view of the interactions within our model (cf., Kline, 2023).

Second, SEM was particularly effective in helping us deal with latent variables—those which are not directly observed but are inferred from other observed variables. This was essential for our research because it involved constructs that can be difficult to measure directly but possible to measure through proxy variables. The inclusion of latent variables ensured that our model reflected our theoretical constructs accurately, consequently improving the validity of our results (cf., Bollen, 1989).

Third, SEM helped us enhance the reliability of our findings because of its capacity to explicitly control for measurement errors. Its ability to do so was essential as we were able to enhance our analysis. In addition, we were able to address issues associated with the accuracy of variable measurements. Addressing such problems is essential because they can influence the interpretation of the moderation effects. Thus, by accounting for these measurement errors, SEM helped us ensure that our conclusions about the moderator variables' effects are both accurate and robust (cf., Byrne, 2013). In some ways, SEM provided us with a strong methodological foundation enabling us to examine our complex model, which featured moderation effects—a step that was important in terms of addressing our aims and research objectives.

The later sections focus on aspects like confirmatory factor analysis (CFA) that comprise evaluations of reliability, convergent and discriminant validity, as well as the analysis of standardized regression paths within the structural model. SEM methodology encompasses both CFA and structural model analysis. While CFA is instrumental in affirming the validity of the measurements taken, structural model analysis rigorously tests the research hypotheses outlined in our theoretical model. As highlighted before, the CFA component of SEM specifically focuses on confirming the validity of the measurements we used. This entails examining the relationships between the observed indicators and their corresponding latent variables, as well as relationships among the latent variables themselves.

5. Results

The model presented in Figure 1 was developed and tested to appraise the significance of its constructs. To test the hypotheses, results for the variables were generated using partial least squares (PLS), and a visual representation of this structural model is provided in Figure 2. The structural model examined the path co–efficients (β), co–efficient of determination (R^2), and effect size (f^2). According to the results, the empirical model explains 63.5% (R2) of entrepreneurial intentions among early–stage African entrepreneurs.

–Insert Figure 2 about here–

Table 3 below outlines the predictive influence of the independent variables on dependent variables, a process described as direct effect. Beta values serve as indicators of both the direction and magnitude of these relationships. Meanwhile, p–values assess the statistical importance of these predictive effects. A p–value falling below 0.05 substantiates the significance of the relationship in question. The PLS path analysis also provided the moderating effects of the constructs associated with the technostress concept on the independent variables.

–Insert Table 3 about here–

The results in Table 3 reveal that perceived behavior control ($\beta=0.409$, $p< 0.001$) has a positive and significant influence on entrepreneurial intentions. This outcome

supports Hypothesis 1. With Hypothesis 2, our aim was to explore the effect of entrepreneurial passion on entrepreneurial intentions. The results confirm that the hypothesis demonstrates a positive and significant impact ($\beta = 0.166$, $p < 0.05$). In the case of Hypothesis 3, the goal was to investigate the direct impact of digital self–efficacy on entrepreneurial intentions. Consistent with that, our findings suggest a significant and positive effect ($\beta = 0.162$, $p < 0.001$), thus supporting Hypothesis 3.

In our study, technostress serves as a moderator for the aforementioned Hypotheses 1, 2, and 3. Accordingly, we examined the moderating effects of technostress by analyzing four sub–factors: overload, invasion, complexity, and uncertainty. This approach allowed us to deliver more precise and accurate results, demonstrating how technostress moderates entrepreneurial intentions.

Regarding Hypothesis 4, the SEM analysis shows that the positive relationship between perceived behavioral control and entrepreneurial intentions is negatively moderated by overload ($\beta = -0.173$, $p < 0.001$), and positively moderated by invasion ($\beta = 0.331$, $p < 0.001$). However, the findings do not demonstrate a moderating effect of uncertainty ($\beta = -0.043$, $p > 0.1$) and complexity ($\beta = -0.1$, $p > 0.1$), two other indicators of technostress, on the relationship between perceived behavioral control and entrepreneurial intentions. Only the sub–factors of technostress, overload, and invasion moderated this link in opposite directions. Thus, the results partially supported Hypothesis 4 since the level of uncertainty and complexity did not moderate the aforementioned link.

To explain the moderating effects of overload and invasion on the link between perceived behavioral control and entrepreneurial intentions, we present two graphs, 3 and 4. Graph 3 below illustrates that although entrepreneurial intentions increase with higher perceived behavioral control at both high and low levels of overload, respondents with lower levels of overload exhibit stronger entrepreneurial intentions compared to those with higher levels of overload, even when both groups perceive the same amount of behavioral control. Thus, this finding indicates that the direction of the moderating effect of overload is negative. Accordingly, the effect of perceived behavioral control on entrepreneurial intentions depends on the level of techno–overload.

–Insert Graph 3 about here–

Graph 4 below indicates that any level of invasion ultimately leads to increased entrepreneurial intentions as perceived behavioral control increases. However, this intention is more pronounced for respondents who perceive a higher level of invasion. In other words, Graph 4 indicates that perceived behavioral control positively affects entrepreneurial intentions at high and low levels of invasion. The graph highlights that when respondents perceive greater behavioral control and experience higher levels of invasion, they show significantly stronger entrepreneurial intentions compared to those who perceive lower levels of invasion. We, therefore, conclude that the effect of perceived behavioral control on entrepreneurial intentions depends on the level of invasion.

–Insert Graph 4 about here–

In terms of Hypothesis 5, our aim was to examine the moderating effects of technostress, which include uncertainty, overload, invasion, and complexity, on the relationship between entrepreneurship passion and entrepreneurial intentions. Our findings show that techno-overload ($\beta = 0.166$, $p < 0.05$) positively moderated the relationship between entrepreneurship passion and entrepreneurial intentions, while invasion ($\beta = -0.474$, $p < 0.001$) negatively moderated it. However, the other two technostress factors—uncertainty ($\beta = 0.120$, $p > 0.1$) and complexity ($\beta = 0.073$, $p > 0.1$)—did not show a moderating effect on the relationship between entrepreneurship passion and entrepreneurial intentions. Therefore, the results only partially supported Hypothesis 5, as the levels of uncertainty and complexity did not moderate the aforementioned link.

The moderation effect shown in Graph 5 below suggests that entrepreneurship passion positively affects entrepreneurial intentions at both high and low levels of techno–overload. However, the effect of entrepreneurship passion on entrepreneurial intentions is stronger only among respondents with a high level of techno–overload. This relationship is almost null (no effect) among respondents with a low overload score, hence the flat red slope. Therefore, the effect of entrepreneurship passion on entrepreneurial intentions depends on the level of techno–overload.

–Insert Graph 5 about here–

Furthermore, the moderation effect shown in Graph 6 indicates that entrepreneurship passion positively affects entrepreneurial intentions at a low level of invasion (high entrepreneurship passion scores are associated with high entrepreneurial intentions). While at a high level of invasion, this relationship becomes negative—meaning that an increase in entrepreneurship passion translates into a decrease in entrepreneurial intentions among people with high invasion scores. In conclusion, the effect of entrepreneurial passion on entrepreneurial intentions depends on the level of invasion.

–Insert Graph 6 about here–

Finally, the results in Table 3 reveal no moderating effect of technostress on the relationship between digital self–efficacy and entrepreneurship intentions. Thus, there is no support for hypothesis 6.

6. Discussion

Although research on the benefits of digital technology platforms has markedly advanced (Jeyaraj *et al.,* 2023), work on the issue of technostress has been slow to catch up, especially in African entrepreneurship. Accordingly, this study focuses on the underlying technostress mechanisms of overload, invasion, complexity, and uncertainty (Ayyagari *et al.,* 2011; Bunjak *et al.,* 2021; Choi *et al.,* 2016; Tarafdar *et al.,* 2007; Thurik *et al.,* 2024) and provides theoretical explanations of their impact

on African entrepreneurs (cf., Ajide and Osinubi, 2023). Essentially, and considering that entrepreneurship is seen as a viable route out of poverty for many people in situations similar to those experienced by these African entrepreneurs (see Bruton *et al.,* 2013; Sutter *et al.,* 2019), knowledge about the impact of technostress can be the genesis of productive entrepreneurship practices (cf., Kirzner, 1971). Taken together, our theorizations and research outcomes contribute to entrepreneurship and IT research as follows below.

First, our theoretical explanations of the ways in which technostress variably influences perceived behavior control (PBC), entrepreneurship passion (EP), and digital self–efficacy (DSE) in connection with entrepreneurial intentions (EIs) (cf., Ajzen, 2012; Jeyaraj *et al.,* 2023) in African entrepreneurship help to account for its impact on early–stage African entrepreneurs. In other words, the theoretical explanations we advanced with hypotheses H1, H2, and H3 that took an African entrepreneurship perspective suggest a linear relationship involving perceived behavior control, entrepreneurship passion, and digital self–efficacy with entrepreneurial intentions (Ajzen, 2002; Nkwei *et al.,* 2023).

Consistent with the above, empirical evidence generated from statistical inferences confirms that perceived behavioral control has a positive effect on the entrepreneurial intentions of early–stage African entrepreneurs who excessively consume digital technology. Among this group of entrepreneurs, perceived behavioral control is stronger on their entrepreneurial intentions, especially those with high levels of techno–overload (i.e., high use of digital technology) than those with low

techno–overload scores (cf., Srivastava *et al.,* 2015; Thurik *et al.,* 2024). This extends understanding of the antecedents and implications of technostress (Ayyagari *et al.,* 2011) by showing how this form of technology–induced stress impacts African entrepreneurs. When it comes to those African entrepreneurs who are heavily immersed in using digital technology, in other words, for entrepreneurs who have become preoccupied with digital technology, their entrepreneurial passion can actually translate into a decrease in their entrepreneurial intentions due to this high invasion level. Such an understanding provides theoretical explanations of the moderating effects of technostress as we predicted with our Hypotheses 4, 5, and 6. Essentially, this study extends the works of Hang *et al.* (2022) and Srivastava *et al.* (2015) who respectively concluded that techno–overload had a negative association with the well–being of a group of employees they studied and was also the root cause of burnout among managers.

Second, focusing on early–stage African entrepreneurs contributes new understanding of their entrepreneurial journeys in contexts that are often less understood in mainstream entrepreneurship research (cf., Simba *et al.,* 2023). Thus, such insights contribute to the debate on entrepreneurship from a process perspective (see Shane and Venkataraman, 2000; Zahra and Dess, 2001). Moreover, by elaborating on the entrepreneurial processes that define the trajectories of these entrepreneurs, we make entrepreneurship research inclusive (see Bakker and McMullen, 2023). In some ways, we integrate African entrepreneurship into mainstream research.

Third, by focusing on an African context (cf., Morris *et al.,* 2023; Newbert *et al.,* 2022), the study contributes to the notion of contextualizing theory building in entrepreneurship (Welter *et al.,* 2011; Zahra and Wright, 2011). Indeed, by generating new theoretical perspectives derived from technostress–African entrepreneurship phenomenon, this study uncovers and contributes subtle entrepreneurship actions embedded in Africa's entrepreneurial context. Thus, we facilitate a theoretical dialogue between scholarly research and the contexts to generate new theoretical explanations (cf., Banerjee, 2022; Bruton *et al.,* 2022).

6.1 Research implications

The theoretical explanations presented in this research have scholarly, practical, social, and policy implications. For scholarly researchers, the new model illustrating the moderating effect of technostress in African entrepreneurship encourages future studies that can focus on technostress in other developing world contexts. In the case of African entrepreneurs, we can begin to comprehend the consequences of excessive digital technology consumption. Thus, the outcomes of this study can be instructive for entrepreneurs by raising awareness of the "dark side" of entrepreneurship (cf., Lerman *et al.,* 2021). From a well–being perspective, the results of this study highlight the issue of technology–induced stress that might lead to societal problems, including technology overload (Bunjak *et al.,* 2021), computer apprehension (Wang *et al.,* 2008) and stress (Lee *et al.,* 2016). Considering these societal issues stemming from excessive use of digital technology in entrepreneurship, they initiate a debate on

policy reforms aimed at entrepreneurs vulnerable to excessive digital technology consumption.

Such reforms can be crucial in facilitating the achievement of the UN's Sustainable Development Goals (SDGs), for example, SDG 3 regarding good health and well–being. Entrepreneurs in good physical and mental conditions are productive and contribute to their communities in various ways. Indeed, and in addition to building their own wealth (Schumpeter, 1934), they create job opportunities for others, driving the economic and societal development of their communities (Ning, 2021; OECD, 2017). In the context of Africa, the jobs they create can be a source of income for many households that experience poverty and lack of decent employment. Thus, their constructive actions can be part of the efforts to alleviate poverty (SDG 1) and provide decent work and economic growth (SDG8).

7. Conclusion

Technostress in African entrepreneurship is a phenomenon that has severe well–being issues for entrepreneurs in this part of the globe. This study empirically shows that technostress weighs heavily on early–stage African entrepreneurs. It impacts their entrepreneurial intentions in several ways and results in technology overload, computer anxiety, and it can reduce productive entrepreneurship. Therefore, developing a better understanding of the problem in rarely studied contexts like the African continent places the spotlight on the issue of technostress in such a way that encourages research, policy debate, and social discourse on how best to support early–

stage African entrepreneurs. From an academic perspective, focus on the issues of technostress advances theorizations about its mechanisms and their manifestation in African entrepreneurship. This is important for entrepreneurship, regional economic development, and most importantly, for poverty alleviation initiatives and social mobility in the region.

- Furthermore, to tackle issues of the excessive use of technology associated with technostress, this study has the following recommendations:
- As aspiring entrepreneurs undergo entrepreneurship education or training, whether through university, college, or another tertiary education pathway, support in the form of awareness of the risks associated with excessive technology should also be provided.
- Government policy institutions should offer guidelines through white papers as well as via popular media to communicate the dangers of overusing digital technology among aspiring entrepreneurs.
- Working in collaboration, both government and private institutions engaged in entrepreneurship policy development should actively deliver a consistent message and instructions through dedicated workshops, seminars, and webinars on how to avoid falling into the trap of techno–overload.

7.1 Limitations and suggestions for future research

As with any research project, our study has limitations. For example, its inquiry focused on six out of nine regions in South Africa, including Gauteng, KwaZulu Natal, Eastern Cape, Limpopo, Mpumalanga and Western Cape. Despite that, our choice to focus on six regions was based on critical mass in terms of entrepreneurship engagement, that is, in regions with a high concentration of early–stage entrepreneurs and economic significance, we recommend future studies that incorporate participants from all nine regions regardless. This can potentially advance our research because drawing empirical evidence from a sizable base of participants can lead to firm conclusions or inferences that are generalizable to a large population. That can be pivotal for regional economics and social dynamics, especially when it comes to IT–related policy development and redistribution of resources. Such research efforts can produce evidence showing the level of support needed for a healthy consumption of digital technology, particularly among early–stage entrepreneurs.

Furthermore, future research should also aim to focus on different demographics to examine the effects of technological overload. Such an inquiry can produce insights that are helpful for making a comprehensive comparative analysis of digital technology use across different user groups, and in particular those classified as early–stage entrepreneurs. Most importantly, such research can potentially highlight the extent of the impact of technostress per user group across South Africa's nine main regions.

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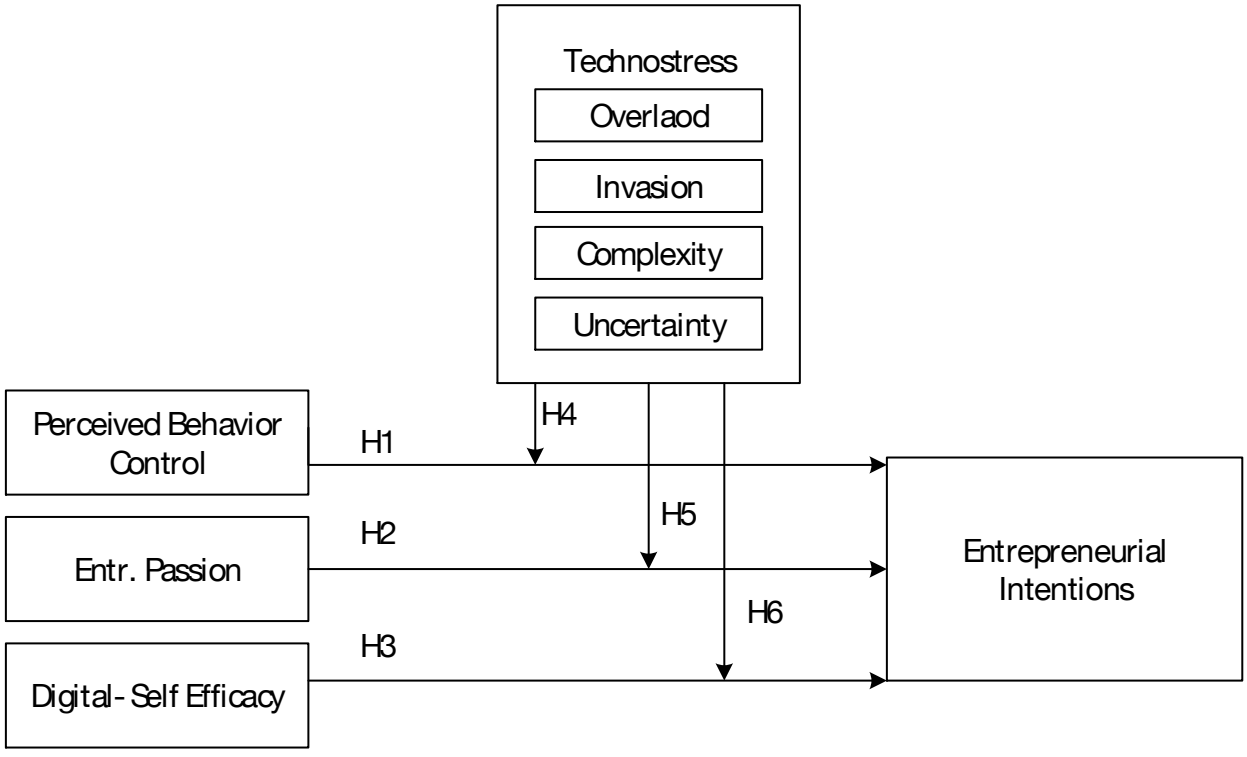
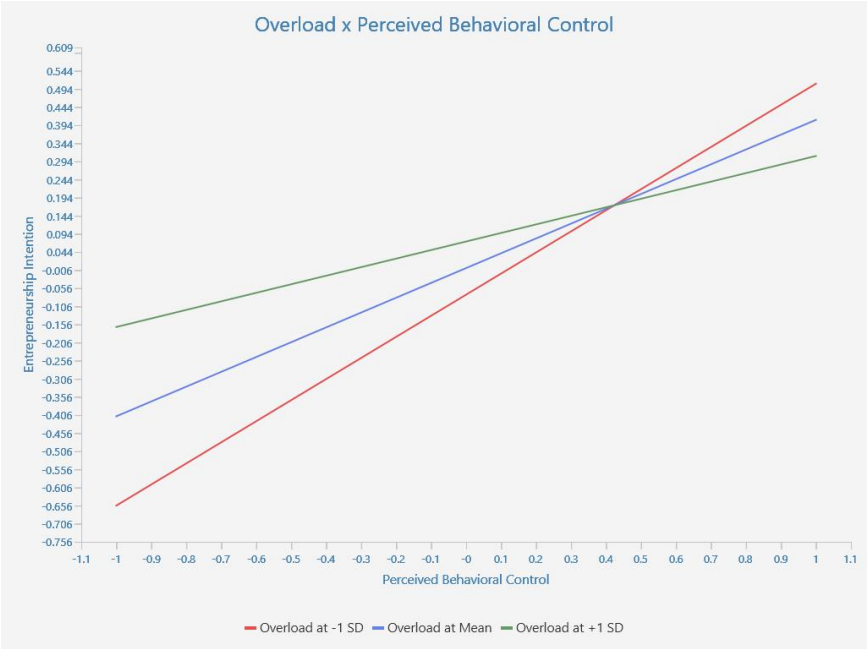
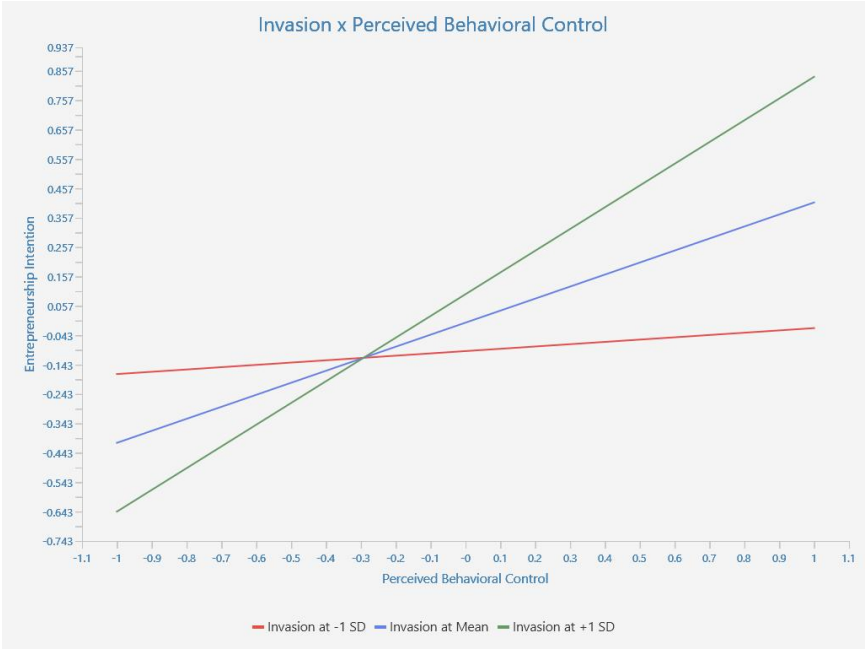
Figure 1: Conceptual model of technostress in African entrepreneurship



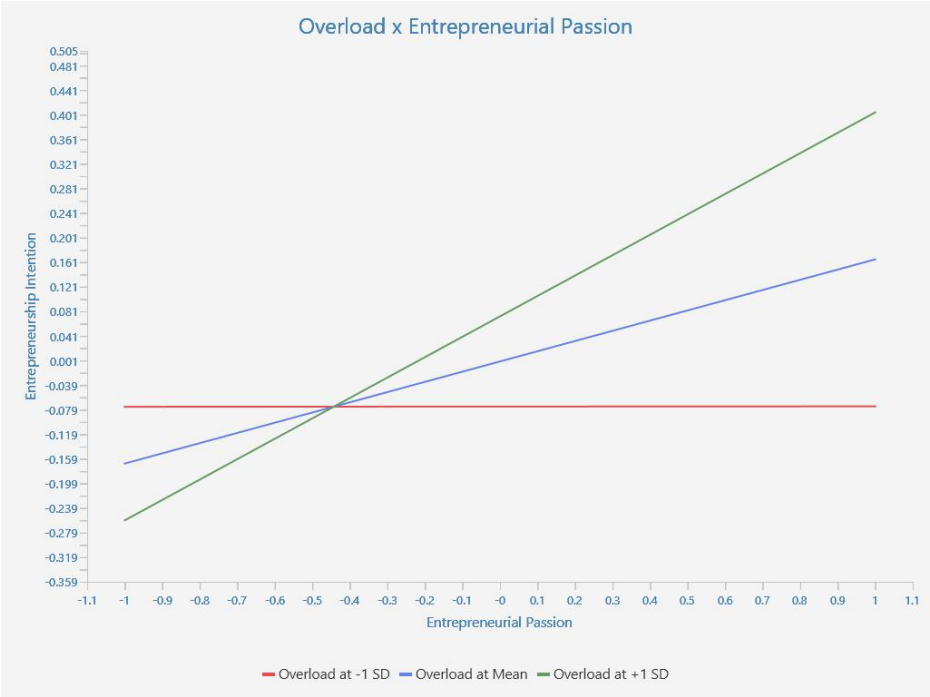
Graph 3: Moderating effect of overload – perceived behavioral control



Graph 4: Moderating effect of invasion – perceived behavioral control



Graph 5: Moderating effect of overload – entrepreneurship passion



Graph 6: Moderating effect of invasion – entrepreneurial passion

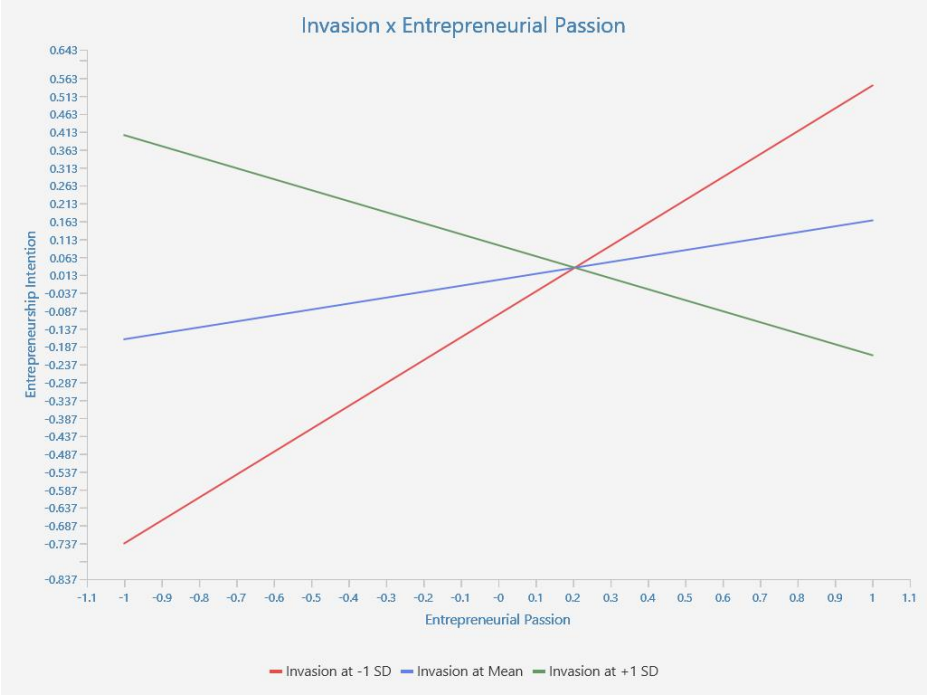


Table 1: Construct reliability and convergent validity

indicator	*Factor loadings*	*Constructs*	*Cronbach's alpha*	*Composite reliability*	*Average variance extracted (AVE)*
DSE1	0.737	Digital Self Efficacy	0.847	0.848	0.621
DSE2	0.804				
DSE3	0.810				
DSE4	0.794				
DSE5	0.792				
PBC1	0.70	Perceived Behavioural control	0.852	0.855	0.576
PBC2	0.817				
PBC3	0.763				
PBC4	0.760				
PBC5	0.763				
PBC6	0.756				
EP1	0.731	Entrepreneurial Passion	0.857	0.858	0.637
EP2	0.841				
EP3	0.802				
EP4	0.834				
EP5	0.778				
IV1	0.849	Technostress – Invasion	0.894	0.904	0.758
IV2	0.889				
IV3	0.901				
IV4	0.841				
OV1	0.867	Technostress – Overload	0.842	0.866	0.674
OV2	0.781				
OV3	0.829				
OV4	0.805				
UNC1	0.894	Technostress – Uncertainty	0.773	0.820	0.687
UNC2	0.872				
UNC3	0.709				
COM1	0.862	Technostress – Complexity	0.923	0.930	0.764
COM2	0.914				
COM3	0.888				
COM4	0.842				
COM5	0.864				
EI1	0.810	Entrepreneurship Intention	0.812	0.812	0.639
EI2	0.802				
EI3	0.816				
EI4	0.769				

Table 2: Fornell and Larker

	Complexity	*Dig. Self-Efficacy*	*Ent. Passion*	*Ent. Intention*	*Invasion*	*Overload*	*Per. Behavioural Control*	*Uncertainty*
Complexity	0.874							
Digital Self-Efficacy	0.234	0.788						
Ent.l Passion	0.110	0.585	0.798					
Ent. Intention	0.200	0.559	0.642	0.800				
Invasion	0.836	0.288	0.187	0.245	0.870			
Overload	0.605	0.371	0.282	0.376	0.667	0.821		
Per. Behavioural Control	0.297	0.574	0.685	0.710	0.328	0.438	0.759	
Uncertainty	0.612	0.424	0.265	0.287	0.547	0.284	0.278	0.829

Table 3: Path coefficient for direct effect and moderating effects

Path from	***To***	***Beta value***	***Results***
perceived behaviour control	Entrepreneurship Intention	0.409***	H1 supported
Entrepreneurship passion	Entrepreneurship Intention	0.166**	H2 supported
Digital Self-Efficacy	Entrepreneurship Intention	0.162***	H3 supported
*Uncertainty * Perceived Behavioral Control*	Entrepreneurship Intention	-0.043	
*Overload * Perceived Behavioral Control*	Entrepreneurship Intention	-0.173***	

*Invasion * Perceived Behavioral Control*	Entrepreneurship Intention	0.331***	H4 partially supported
*Complexity * Perceived Behavioral Control*	Entrepreneurship Intention	-0.100	
*Uncertainty * Entrepreneurial Passion*	Entrepreneurship Intention	0.120	
*Overload * Entrepreneurial Passion*	Entrepreneurship Intention	0.166**	
*Invasion * Entrepreneurial Passion*	Entrepreneurship Intention	-0.474***	H5 partially supported
*Complexity * Entrepreneurial Passion*	Entrepreneurship Intention	0.073	
*Uncertainty * Digital Self-Efficacy*	Entrepreneurship Intention	0.024	
*Invasion * Digital Self-Efficacy*	Entrepreneurship Intention	0.022	
*Overload * Digital Self-Efficacy*	Entrepreneurship Intention	-0.034	H6 not supported
*Complexity * Digital Self-Efficacy*	Entrepreneurship Intention	0.040	

***p ≤ 0.001, **p ≤ 0.01, and *p ≤ 0.05