The Impact of IT Culture and Personal Innovativeness in Information Technology on Digital Entrepreneurship Success

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Abstract

Purpose – Very little or no study has explored the predictors of behaviour and traits that determine digital entrepreneurship (DE) success. In response, the purpose of this paper is to present a research model that takes information technology (IT) culture as a theoretical lens and personal innovativeness, and experience in IT projects as theoretical constructs to predict behaviour and traits that explain DE success.

Design/methodology/approach – Based on the literature review, the authors propose hypotheses and a research model. We tested the model using structural equation modelling, by surveying a sample of digital entrepreneurs operating in the Yabacon Valley, Lagos, Nigeria.

Results – The results indicate that information technology (IT) culture is an essential predictor of achieving digital entrepreneurship (DE) success. The results also suggest that an entrepreneur's innovativeness in IT and experience in IT projects have significant negative and positive moderating effects on the relationship between IT culture and achieving DE success.

Research limitations/implications – This paper taps into a new setting – digital entrepreneurship (DE) context – by exploring the moderation effects of an entrepreneur's innovativeness in IT and experience in IT projects on the link between their information technology culture and achieving a successful DE outcome.

Practical implications – This model offers managers an understanding of how information technology (IT) culture and personal innovativeness and experience in IT work together to achieve digital entrepreneurship success. Meanwhile, it sheds some light on managers to treat individuals with different levels of experience differently.

Originality/value – We theorise information technology (IT) culture, personal innovativeness, and experience in IT and show their effects on digital entrepreneurship success, thus making an essential contribution to the information systems and entrepreneurship research and practice. Moreover, we provide a novel methodology to conceptualise IT culture as a second-order hierarchical reflective construct by giving evidence that partial least squares path modelling can assess a hierarchical model with moderating effects. This study answers scholars' call to construct more accurate explanations of innovation outcomes in an increasingly digital world.

Keywords IT culture, Personal innovativeness in information technology, experience in IT projects, Digital entrepreneurship

Paper type Research paper

1. Introduction

A nation's competitiveness depends on its industry's entrepreneurial nature, the industry's capacity to innovate and upgrade (Porter, 2011). With the emergence of the creative economy (see Howkins, 2002), a driver of international competitiveness is how creative individuals produce innovative products/services in creative hubs and creative cities. Information systems (IS) and entrepreneurship studies highlight that digital Entrepreneurship (DE) is significantly contributing to the creative economy (Del Giudice and Straub, 2011; Yoo et al., 2010). Emerging digital technologies (e.g., analytics, cloud computing, 3D printing, mobile, or social media devices) facilitate digitised work and entrepreneurial activities that are dynamic and fluid, contributing to the digital economy due to the technologies' ability to facilitate creative activities. Understanding the success factors of DE can reveal how organisations can develop favourable digital technologies to enhance innovation.

Further, understanding the determinants of a successful DE outcome can be vital for developing and sustaining a creative economy. The existing DE literature reports that digital technology with potentials of openness, affordances, and generativity (Nambisan et al., 2019) plays a significant role in enabling the success of entrepreneurship (e.g., Boutetiere and Reich, 2018; Steininger,

2019) and founders' social capital, organisational and developmental processes are crucial to achieving a successful outcome (Spiegel et al., 2016; Zaheer et al., 2019). However, we know very little about the particular behaviours and traits of entrepreneurs' that influence successful DE outcomes. Like the achievement of entrepreneurship success (see Miller, 2015; Staniewski, 2016), the digital entrepreneur's behaviour and traits can impact DE success. Consistent with the DE literature (e.g., Sussan and Acs, 2017; Nambisan, 2017), we define digital entrepreneurs as individuals who undertake practices and activities to deliver products/services mainly through digital technology with little or no involvement with a physical component. Digital entrepreneurs would appropriate technology to overcome the risks and uncertainties they face to create successful new enterprises. Understanding digital entrepreneurs' behaviours and traits are pressing, considering that they pursue their objectives in uncertain and complex environments typical of digital spaces (Du et al., 2018; Martinez Dy, Marlow & Martin, 2017). Hence, which predictors of behaviour and traits determine DE success? This paper focuses on the behaviour and traits predictors, such as the cultural values, personalities, and experiences of digital entrepreneurs.

Research suggests that people's cultural values reflect their behaviours toward information technology (IT) (e.g., Abubakre et al., 2017; Ravishankar et al., 2011; Reinecke and Bernstein, 2013). The exploration of digital entrepreneurs' cultural values is mostly missing in the studies on digital entrepreneurship (Fang et al., 2016). We can conceptualise digital entrepreneurs' cultural values from the IT culture theory, a subset of IT-related cultural values espoused by individuals (see Abubakre et al., 2017; Walsh et al., 2010; Walsh, 2014). Unlike taking culture at the national or organisational levels, taking IT culture at the individual level highlights IT ubiquity in an IT user's daily life, combining their work and social practices (Walsh, 2014). The individual's interrelationship of work and social practices caused by the interaction of the practices with IT are influenced by the individual's needs and motivations to use IT instead of an organisational or subgroup needs and motivations for IT use (Abubakre et al., 2017, Walsh et al., 2010). Thus, by understanding an individual's IT needs and motivations, the IT culture concept can explain the digital entrepreneur's different behaviours when undertaking dynamic and fluid work. Put differently, the study of IT culture may be particularly useful in describing how individuals interact with and apply technology in individualised contexts such as DE, vital to understanding the behaviours that determine DE success.

Similarly, the traits a person possesses would shape their personality type when interacting with IT (e.g., Dai et al., 2015; Yuan et al., 2016). For example, individuals who exhibit high self-confidence and risk-seeking would show a personality type that is willing to innovate with IT. Personality type conceptualisation is derived from the work of Agarwal and Prasad (1998). They define personal innovativeness in IT (PIIT) as the individual traits that explain why an individual would be willing to engage with new information technology. Many IS studies have highlighted the PIIT construct as a vital concept for explaining individuals' IT acceptance and usage behaviours (e.g., Dai et al., 2015; Hwang, 2014; Yuan et al., 2016). PIIT is a construct reflecting an individual's tendency to adopt and leverage an innovation such as digital technology. Personality type has an interrelationship with cultural values because the variance in cultural values is influenced by personality traits and exposure (Meglino and Ravlin, 1998). Understanding digital entrepreneurs' personalities can also be crucial to know how their behaviours and traits shape their dynamic and fluid entrepreneurial activities for successful DE outcomes. Therefore, digital entrepreneurial projects are likely to be influenced by the entrepreneur's PIIT and IT cultural values. Hence, understanding the interrelationship between digital entrepreneurs' IT culture and their personality type can lead to developing a model that explains cultural and

personality factors that determines DE success. By taking these dual theories (IT culture and PIIT), we will understand the behaviour and traits of digital entrepreneurs that result in successful DE, an outcome vital for developing a nation's creative capacity and competitiveness.

Beyond considering digital entrepreneurs' IT culture and PIIT, we also theorise that an entrepreneur's experience impacts a successful DE outcome. IS studies have reported that prior experiences are crucial to developing the knowledge and expertise to overcoming business problems in IT projects to realise entrepreneurial success (e.g., Liu et al., 2018; Song et al. 2018, Zaheer et al., 2019). Moreover, experience developed over time is likely to impact beliefs and attitudes, affecting IT and business problems (Kollmann et al., 2009; Tan and Gallupe, 2006), having a corresponding effect on DE outcome. Hence, entrepreneurs experienced in IT projects would have strong motivations to engage with digital technology for DE activities and have a positive impact on DE outcome. Motivated by the arguments mentioned above, this study explores the relationship between an entrepreneur's IT culture and their innovativeness and experience in IT projects as theoretical constructs to predict behaviour and traits and the likelihood of a successful DE outcome. Hence, this paper proposes hypotheses that test the relationships between IT culture, personal innovativeness in IT, and IT project experience to explain DE success. Based on the theoretical insights from IT culture, personal innovativeness, and experience in IT projects, survey analysis, based on 309 digital entrepreneurs operating in the Yabacon Valley, Nigeria, shows that positive IT culture archetypes enable DE success. The analysis further indicates that personal innovativeness and experience in IT projects respectively have significant negative and positive moderating effects on the relationship between IT culture and DE success.

Beyond the purpose of providing robust empirical generalisations, our study makes three specific contributions to the IS and entrepreneurship literature. First, it contributes to the literature by analysing the interplay between IT culture, PIIT, and experience in IT projects as essential determinants of DE success. Second, it contributes to the research stream on needs and motivations (e.g., Deci and Ryan, 2008; Rokeach, 1973; Walsh et al., 2014) by using IT culture as an indicator of cultural values of digital entrepreneurs and by investigating its fit with personal innovativeness as a determinant of DE success. Third, the study reveals how enterprises can develop positive IT culture and personal innovativeness of digital entrepreneurs to enhance entrepreneurial success.

2. Theoretical background and hypotheses

This study assumes that to achieve successful digital entrepreneurship (DE) projects, an entrepreneur's information technology (IT) culture, personal innovativeness in IT, and IT project experience play vital roles. Figure 1. shows the research model for the study.

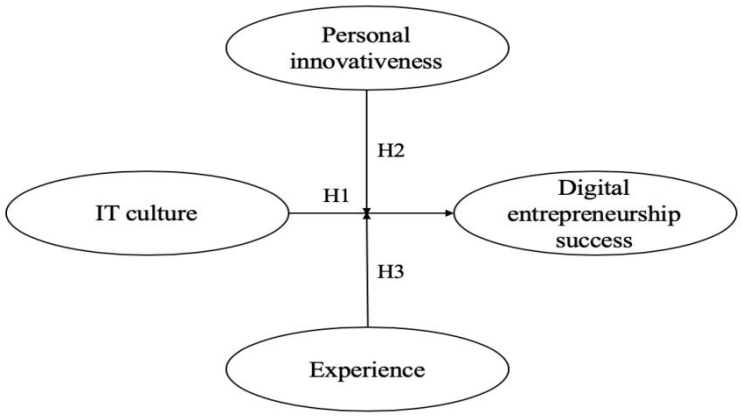

Figure 1. Research model

Information Technology Culture

The theoretical lens of IT culture appears in information systems (IS) literature. Kaarst-Brown and Robey (1999) used this lens at the organisational level to investigate how information technology (IT)'s cultural aspects interfere with IS management and governance. Walsh et al. (2010) consider IT usage a socially constructed phenomenon through a progressive IT acculturation process; this process is a cultural learning process resulting from exposure to IT experiences. The more IT acculturated the users are; the more their fundamental needs are satisfied through IT usage, the more developed are their needs for IT, and the more self-determined their IT usage becomes. Therefore, understanding IT cultural values may provide a much clearer picture for predicting how individuals or social groups perceive and ultimately respond to IT-based change like digitalisation. Following the logic that cultural values directly influence behaviour, we conceptualise an entrepreneur's behaviour and traits from the IT culture theory (Abubakre et al., 2017; Walsh's 2014). IT-related cultural values specify an individual's personal beliefs about whether he or she should engage with IT. In other words, cultural values define the motivating behaviours necessary for satisfying an individual's needs. Thus, the individual IT culture is captured by exploring an individual's universal needs and their motivations that are fulfilled (or not) by the usage of IT (Walsh et al., 2010; Walsh, 2014), as the needs and motivation concepts are interconnected with cultural values (Rokeach, 1973). We take into consideration the users' different types of motivations. First, intrinsic IT motivations are based on IT's use for the satisfaction inherent to its usage (Walsh et al., 2010). Moreover, extrinsic IT motivations (in which IT may be used as a means to an end to attain a specific outcome (Walsh et al., 2010). Also, their different needs – primary needs and secondary needs: accomplishment needs, affiliation needs, and power needs for IT as perceived by users – and apply them to study the path leading from IT culture to IT success.

Digital Entrepreneurship Success and Information Technology Culture

Digital entrepreneurship (DE) is a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organisation, has been digitalised due to the availability and application of digital technologies allowing new possibilities and forms of entrepreneurship (Nambisan, 2017; von Briel et al., 2018). Sussan and Acs (2017) expand the view of DE by highlighting an agent-centred view. This suggests that agents would leverage digital technology to effectively and efficiently seek and act on entrepreneurial opportunities. Some of these agents performing activities that need digital engagement may be the technology creators or technology users. For example, the Uber founders, who are technical agents, created a two-side mobile transportation-sharing application that links transport providers and transport seekers. The mobile app allows a taxi driver who may not be technical agents to use the app to pursue their entrepreneurial objectives by enabling a commuter to use the app to submit a trip request to a driver nearby.

Unlike traditional enterprises, DE is dynamic and fluid due to the constant change in scope, features of digital technologies, and the value of product or service offerings (Nambisan, 2017). For example, by modifying the digital analytic components in boilers, Baxi, a United Kingdom boiler manufacturing company, provides constant changing "usage-based" energy and water products to its customers. Similarly, a Nigerian crowdfunding online platform (NaijaFund) changes the traditional ways of funding new DE projects. Through its platform, the users can connect their accounts with social media networks to be visible to venture capitalists from any part of the world. Therefore, the NaijaFund platform provides connectivity and scope; thereby, budding

entrepreneurs can bypass traditional financing to fund their projects. The less stable boundaries in DE processes make entrepreneurs respond to the digital arena's fluidity by creating new path-breaking innovation and business models that disrupt existing and traditional ones (Henfridsson and Yoo, 2014; Nambisan, 2017). Hence, DE is consistent with Schumpeter's (1934) theory of development, which argues that entrepreneurs disrupt established, reputable industries by inventing new ones. For example, the rise of digital companies like Apple, Facebook, and Google and the decline of traditional companies like General Motors and Kodak. The disruption of traditional business models and the creation of new ones highlight the increasing competitiveness facing modern-day ventures.

The entrepreneur's motivation or proposed goals would shape the achievement of successful entrepreneurship. The literature classifies the factors for achieving successful entrepreneurship as quantitative and qualitative. The quantitative factors include economic/financial metrics that highlight if costing is within budget (Peppard et al., 2007), profitability, market share (Staniewski, 2016; Wiklund and Shepherd, 2005), turnover (Amit et al., 2000; Staniewski, 2016). Other quantitative measures include timing to measure if the project was completed as planned (Peppard et al., 2007) and if the products/services are delivered according to predefined specifications (Cecez-Kecmanovic et al. 2014). Qualitative factors are entrepreneurs or customer satisfaction of delivered products/services, innovativeness of the offered product/service (Covin et al., 2006; Henard and Szymanski, 2001; Staniewski, 2016). While the qualitative factors would lead to achieving the quantitative factors, achieving the qualitative factors would mostly depend on the digital entrepreneurs' skills, knowledge, competencies, and innovativeness.

In the literature, networking and building up valuable social capital based on the network partners developed during the entrepreneur's career is vital to achieving successful DE (e.g., Spiegel et al., 2016). In a more recent study, Zaheer et al. (2018) report that digital entrepreneurs' experience, motivation, together with personal skills, are directly linked to the success factors of DE. Put differently, the digital entrepreneurs' knowledge, motivation, and own skills would shape their behaviours and traits and their actions to achieve successful DE projects. Entrepreneurs' digital technology usage can be based on their needs and motivations to use technology features to achieve their goals. As argued above, the entrepreneur's needs and motivations to use the features of digital technologies highlight the IT culture theory (Walsh et al., 2010). Research on individuals' motivation to use IT is a well-established topic in IS research; motivation is an essential predictor for technology acceptance and usage (see Malhotra and Kirsch, 2008; Venkatesh et al., 2003).

Meanwhile, needs are a means to consider cultural influences (Deci and Ryan, 2008) that drive behavioural forces (Maslow, 1970). Rokeach (1973) indicates that needs have to be processed through group norms, thus theorised as antecedents to cultural values. One may investigate culture through the concept of human needs (Walsh and Kefi, 2008). Consistent with Rokeach's work, needs, and motivations emerged as the embodiment of culture for values in our research. The concepts of needs and motivation are closely interrelated, and that their relationships are multiple and complex.

This study takes Walsh's (2014) theorisation of the four positive IT needs and motivations (intrinsic and extrinsic) together as IT culture to present a hypothesis to highlight the relationship between IT culture and DE success. The IT needs to be satisfied through IT usage include affiliation needs (AFFNEE), power needs (POWNEE), accomplishment needs (ACCNEE), and primary needs (PRIMNEE). The individuals who demand to use digital technologies to satisfy the need for affiliation with a workgroup or an informal peer group highlights the AFFNEE users. The

affiliation with a workgroup or an informal peer group implies a tightly-knit framework. Group norms and behaviours are influenced by group members' opinions when making decisions on interacting with technologies (Jin et al., 2008; Sun and Zhang, 2006). Sivadas and Dwyer (2000) highlight a significant link between cooperative behaviours of workgroups and new product success. The AFFNEE users feel they need to be a part of a group because members believe that technologies allow them to keep in touch with other group members (Walsh, 2014), facilitating interrelation, morale, and teamwork. As argued by Büschgens et al. (2013), teamwork is ideal for producing new and innovative products. Thus, an AFFNEE archetype would positively impact on DE, such as facilitating a successful outcome. Therefore, the AFFNEE.

The individuals who have motivations to use digital technology to satisfy a power need are the POWNEE users. Satisfying a power need implies accepting that authority and hierarchy are appreciated and fitting to organising structures. A POWNEE archetype stresses using technology to improve their hierarchy (Walsh et al. 2010). The POWNEE users view technology as a power symbol (Jasperson et al., 2002; Walsh et al. 2010). The ability to master digital products/services, which lead to successful DE outcomes by POWNEE users, should be achievable because they are individuals with strong leadership skills. They can deliver effective decision-making, a degree of coordination, and direction, vital to launching and guiding products through various challenges (Parry and Song, 1994).

The ACCNEE users are individuals who share a motivation to accomplishing goals via the usage of technology. Motivation to achieve goals drive both personal and work relationships by shared attitudes of steadfastness and devotion. Accomplishment is related to conscientiousness, which highlights a trait of individuals motivated to learn (Major et al., 2006) because of their set clear goals to succeed. Previous studies have shown a relationship between having accomplishment traits and technology use. For example, Svendsen et al. (2013) highlight that individuals with accomplishment mindsets will interact more with technological innovations if they assess that the technology provides a prospect to improve job achievement. In a related study, Barnett et al. (2015) highlight that conscientiousness, which includes the accomplishment orientation, positively influences perceived and actual IT use. The ACCNEE archetype finds achievement and purposefulness as vital elements to success. An ACCNEE model achieved by a motivation to accomplishing goals is similar to innovators (Walsh et al., 2010). Therefore, an ACCNEE user would highlight individuals keen on achieving successful innovative and DE outcomes.

The PRIMNEE archetype highlights individuals who share an underlying determination to achieve personal satisfaction via technological innovations use. The PRIMNEE users who have an intrinsic motivation to enjoy the stimulation experience of using technology to satisfy their desires (Walsh et al., 2010) have positive and optimistic outlooks. Such mindsets would help achieve successful DE outcomes because innovation can be accomplished when individuals tend to be happy and of good well-being when they satisfy their desires and goals.

The two concepts - needs and motivations interrelate with the concept of cultural values (Rokeach, 1973). Hence, the four positive IT needs will also be aroused and satisfied by the corresponding positive intrinsic and extrinsic motivations, leading to engaging with digital technology for DE activities and having a positive impact on DE outcome. The exploration of individual needs and motivations fulfilled by digital technology usage highlights the IT culture theory. A positive IT culture emphasises the behaviour of practical mastery of IT and intellectual mastery of information (Walsh et al., 2010) that would be a crucial determinant for DE success. Hence, understanding entrepreneurs' IT culture will provide deeper insights into how they ultimately adjust and respond to DE activities's dynamic and complex innovative nature. IT culture

enables us to explore the cultural aspects of digital technology that interfere with entrepreneurship and the implication for success. Thus, the IT culture theory can explain the specific positive behaviours based on an entrepreneur's IT needs and motivations to determine DE projects' success. Given the above arguments, we present the following hypothesis:

> *H1:* An entrepreneur having positive IT culture will be positively related to achieving a successful digital entrepreneurship outcome.

Personal innovativeness in information technology and digital entrepreneurship success

Personal innovativeness is defined as the level to which an individual is relatively early in adopting an innovation than other members of his/her social system (Rogers and Shoemaker, 1971). Rogers (1995) noted that innovators exhibit specific characteristics behaviour, such as active information seeking and less reliance on subjective evaluation of other members in their social circle about the innovation. Studies on personal innovativeness in technology have been conducted in various areas such as knowledge sharing in online communities (Yuan et al., 2016), consumer satisfaction in an electronic mediated environment (Dai et al., 2015), blog (Wang et al., 2010), and wireless mobile services (Lu et al., 2005). Many personal innovativeness studies adopt Information Systems theories. For example, Unified Theory of Acceptance and Use of Technology, Theory of Reasoned Action, Theory of Planned Behaviour investigates how personal innovativeness in information technology (PIIT) influences users' intentions to use IT and subsequent usage behaviours. Thus, this study aims to build upon the previous studies by exploring the potential effects of differences in individual innovativeness of digital entrepreneurs on digital entrepreneurship (DE) projects' success. In this paper, we use the term PIIT to define a person's eager willingness to engage with digital technological innovations for their entrepreneurial projects.

Studies have theorised PIIT as a moderator of the effects of innovation characteristics on usage intention to adopt and accept new IT (e.g., Agarwal and Prasad, 1998; Fang et al., 2009; Lee et al., 2007). Agarwal and Prasad (1998) also provided valid measures of PIIT and showed that PIIT serves as a critical moderator in technology acceptance behaviour. An individual with a higher PIIT is more likely to have stronger favourable perceptions about new IT, leading to positive intentions and IT usage that leads to success. The better a cultural type fits the personal traits, the higher the chance of achieving goals and objectives (see Meglino and Ravlin, 1998). These include higher skills, knowledge, competencies, and developing new ideas, taking risks innovativeness when appropriating technology, resulting in successful outcomes. These positive outcomes are expected because a congruency in cultural type and personal traits reduces ambiguity and conflict in the way individuals think and work (Eisend et al., 2016; Schein, 2004).

Further, the factor "personal innovativeness" has a significant moderating effect on IT's successful usage. In this study, PIIT is first explored as a moderator on the relationship between IT culture and DE projects' success. As DE project characteristics become increasingly complex, PIIT can be a crucial factor in determining DE success. As a moderator of the antecedent of IT culture, PIIT moderates IT culture; we expect a person with higher levels of PIIT to develop a more positive IT culture. Therefore, the moderator PIIT symbolises the risk-taking trait; we anticipate an entrepreneur with higher levels of PIIT would have more successful DE outcomes. Put differently, the interaction term (PIIT × IT culture) should result in DE success. That way, we imply that a more innovative individual should be more likely to enhance a positive IT culture effect on DE project success than a less innovative individual. Hence, we hypothesize:

H2: Personal Innovativeness in Information Technology will positively moderate the relationship between IT culture and digital entrepreneurship success.

To complete the picture of digital entrepreneurs' characteristics, we posit that their prior working experience influences the attainment of a successful DE outcome. Scholars have reported that experience is a useful micro factor that can impact entrepreneurship success (e.g., Batjargal, 2007; Colombo and Delmastro, 2001). Specifically, IS studies have presented arguments that entrepreneurs can learn from prior experiences to develop their competence, expertise, and knowledge, especially in App development for launching and scaling applications aligned with digital platforms (Liu et al., 2018; Song et al., 2018), software engineering practices and e-business ventures to guide and manage their enterprises to success (Kollmann et al., 2009; Zaheer et al., 2019). Digital enterprises would depend heavily on digital technologists' knowledge and skills, which would considerably develop experience in technological related activities required to solve business problems. Experienced digital entrepreneurs with developed competence, expertise, and knowledge are likely to possess the sophisticated capability to take advantage of digital technology's potentials of openness, affordances, and generativity (Nambisan et al., 2019) to navigate the dynamic and complex digital environment. Hence, IT experience strengthens the digital entrepreneur's needs and motivations to engage with digital technology for DE activities and have a positive impact on DE outcome. Consistent with Kollmann et al. (2009), Tan and Gallupe (2006), beliefs and attitudes are likely to change based on experience developed over time, which can affect addressing IT and business problems, having a corresponding effect on DE outcome. That way, we imply that a more experienced individual should be more likely to positively enhance an IT culture's impact on DE project success than a less experienced individual. Hence, we hypothesize:

H3: Experience in Information Technology will positively moderate the relationship between IT culture and digital entrepreneurship success.

3. Research methodology

Research site

A survey study was conducted among digital entrepreneurs operating in the Yabacon Valley, Yaba, Lagos, Nigeria. In Nigeria, DE is rapidly flourishing. Yabacon Valley is growing as Nigeria's technology hub and a cluster of hundreds of digital start-up companies, banking, and educational institutions that steadily attract angel investors, digital enthusiasts, and media worldwide. Facebook founder Mark Zuckerberg's visit, while on a trip to Nigeria in late 2016 as his first to sub-Saharan Africa, had put Yabacon Valley's ecosystem firmly in the world's spotlight. DE in Nigeria thrives against the odds of weak infrastructure and lack of supportive regulations. Nonetheless, Yabacon Valley has a proven track record in incubating digital entrepreneurs that build new path-breaking innovations that tackle the country's myriad social issues, such as 'Lifebank', an app that locates available blood supplies and delivers it to hospitals (Busari, 2016). Thus, Yabacon Valley is an ideal context to undertake the study.

Sample and participants

The data collection was conducted via an online survey instrument based on the developed research model. An email list of digital entrepreneurs operating in the Yabacon Valley area was collected

from a major Nigerian digital media company's platform, providing a solid base for the research's data collection. The Nigerian digital entrepreneurs that our study focused on were individuals with the talent and expertise to satisfy their needs and motivations to use digital technologies to create digital products and services delivered, marketed, and supported online. The Nigerian digital entrepreneurs employed digital technologies like social media, mobile media, cloud computing, 3D printing, and analytics tools. This was the kind of digital entrepreneur that met the criteria for our sample.

Seven hundred and fifty email invitations to participate in the survey were sent in September 2017, using hyperlinks that can only be used once. Qualtrics hosted the online survey. Second and third follow-up emails are being sent in the subsequent weeks as reminders to participate in the survey. At the end of January 2018, 41% of the invited 750 digital entrepreneurs operating in the Yabacon Valley ecosystem (i.e., 309 digital entrepreneurs) responded to the survey. Almost 78% of respondents were men, 80% aged over 26 years old, and 80% with a Bachelor's degree. The digital entrepreneurs were developers, designers, and data scientists who leveraged the digital space and a sizable Nigerian market to undertake projects related to e-commerce, digital payment systems, digital health, and digital citizenship. Many digital entrepreneurs employed more than one technology. Detailed descriptive statistics on the respondents' characteristics are shown in Table I.

Measure	Value	Frequency	%
Gender	Female	68	22
	Male	241	78
Age	18-25	62	20
	26-35	170	55
	36-45	62	20
	Over 45	15	5
Education	Lower than Bachelor	62	20
	Bachelor	207	67
	Master or higher	40	13
Organisation Type	For profit	201	65
	For non-profit	15	5
	For Both	93	30
Digital Entrepreneurship Projects	e-Commerce	208	67
	Digital payment systems	65	21
	Digital health	31	10
	Digital citizenship	5	2
Number of Digital Entrepreneurship Projects	1-5	207	67
	6-10	56	18
	More than 10	46	15
Digital Technology Type	Analytics tools	71	23
	Cloud computing	43	14
	Mobile media	105	34
	Social media	130	42
	3D printing	15	5

Table I. Descriptive statistics of respondents' characteristics

Measurement

The study adapted Walsh's (2014) three-item scales for each of the four positive IT needs (i.e., AFFNEE, POWNEE, ACCNEE, and PRIMNEE) and two IT motivational measures (extrinsic and

intrinsic) to capture entrepreneurs' IT culture (see appendix A). To measure personal innovativeness in information technology (PIIT), we adapted the item scales of Agarwal and Prasad's (1998) conceptualisation and operational definition of personal innovativeness, which was verified and validated in many IS research. For example, Fang et al. (2009); Hwang (2014); Yi et al. (2006) (see appendix B). Six indicators of digital entrepreneurship (DE) project success are included as dependent variables in the proposed model. First, success was operationalised through time. Time was measured if the project is completed and delivered on time as an outcome to measure project success (Peppard et al., 2007). Second, the DE project was assessed if it was within budget as a financial metric to measure project success (Peppard et al., 2007). Third, the delivery of the project (innovative product/service) according to predefined objectives and specifications (Cecez-Kecmanovic et al., 2014). Fourth, technological performance (e.g., product quality) is based on an individual's subjective assessment (Henard and Szymanski, 2001) as an outcome to measure project success. Fifth, if an individual was satisfied with the end-product (Covin et al., 2006) and, finally, if the completed project is in use (see appendix C). To measure the entrepreneur's IT experience, we take the number of projects the individual had previously managed (Rai et al., 2009).

Further, six sets of control variables are adopted. First, source - captures if the data was gathered from technologists, project managers, senior managers, or business owners (Eisend et al., 2016). Second, project type - captures whether projects are for-profit or non-profiting making; Third, the digital technology type – captures the kind of digital device (e.g., analytics, mobile, or social media) used for the project. The other control variables include gender; age; and education, which is also added based on prior research on IT behaviours (See Morris and Venkatesh, 2010; Tams et al., 2014; Walsh et al., 2010).

Hierarchical model

Hierarchical latent variable models, hierarchical component models, or higher-order constructs are explicit representations of multidimensional constructs at a higher abstraction level. They are related to other constructs at a similar abstraction level, completely mediating the influence from or to their underlying dimensions (Chin, 1998). We note that a critical requirement for defining and operationalising multidimensional constructs is that they should be derived from theory, and theory should indicate the number of (sub)dimensions and their relationship to the higher-order construct (Johnson et al., 2012; MacKenzie et al., 2011; Polites et al., 2012). Our study takes Walsh's (2014) theorisation of the four positive IT needs and motivations (intrinsic and extrinsic) and IT culture to present a hypothesis to highlight the relationship between IT culture and a digital entrepreneurship outcome.

Partial least squares (PLS) path modelling enables scholars to investigate models at a higher level of abstraction (Bayne et al., 1992), which is useful in achieving more theoretical parsimony and less model complexity (Chin and Marcoulides, 1998; Wetzels et al., 2009; Chin, 2010). For this purpose, Wold (1982) suggests using repeated indicators (i.e., the hierarchical component model) for measuring second-order constructs. All indicators of the first-order constructs are reassigned to the second-order construct so that manifest variables are used twice for model estimation. According to Hulland (1999), the researcher needs to decide whether it is more fitting to think of the underlying construct as causing the observed measures (i.e., a reflective relationship) or of the measures as causing or defining the construct (i.e., a formative relationship). However, a prerequisite for the repeated indicators approach is that all first-order and the second-order factors should be reflective. According to Jarvis et al. (2003), such a model is called a total

disaggregation second-order factor model. It has a series of first-order latent factors with reflective indicators. These first-order factors are themselves reflective indicators of an underlying second-order construct.

We modelled IT culture as a reflective first- and second-order construct, consistent with most IS researchers to evaluate models (Shin and Kim, 2011) and adopted Diamantopoulos et al. (2008) guidelines. Moreover, the second-order latent variable should be used as an exogenous variable because its indicators explain its variance. Otherwise, the specification of an additional source of variation (i.e., an antecedent construct) would be conceptually questionable (Diamantopoulos et al., 2008). Thus, all items included in our PLS analysis were configured as reflective indicators (Fornell and Larcker, 1981; Haenlein and Kaplan, 2004). The second-order construct IT culture is considered an exogenous variable. IT culture, as a second-order hierarchical reflective latent variable, is formed by connecting it to the first-order latent variables (IT needs and IT motivations).

4. Data analysis results and discussion

We use the Partial Least Squares (PLS) approach to Structural Equation Modelling (SEM) for data analysis, given its advantage and flexibility regarding distributional properties, measurement level, sample size, model complexity (Chin, 1998; Wetzels et al., 2009). In PLS path models, the explained variance of the endogenous latent variables is maximised by assessing partial model relationships in an iterative sequence of ordinary least squares regressions (Hair et al., 2011). PLS Path models consist of a structural model (inner model) and a measurement model (outer model). The structural model identifies the relationship between latent variables, whereas the measurement model identifies the relationship between a latent variable and clear indicators (Shanmugapriya and Subramanian, 2016).

Smart PLS 2.0 M3 software was used to estimate the model's parameters, following the guidelines provided and detailed by Ringle et al. (2005). That way, we assessed the hierarchical IT culture model. In this case, PLS path modelling was applied with a path-weighting scheme for inside approximation (Tenenhaus et al., 2005; Wetzels et al., 2009; Chin, 2010). Afterward, non-parametric bootstrapping was applied (Tenenhaus et al., 2005; Wetzels et al., 2009; Chin, 2010) with 3000 replications to obtain the standard estimate errors (Chin, 2010). The method of repeated indicators was used as instructed by Wold (1985), Lohmöller (1989), and Efron and Tibshirani (1993) to determine the higher-order latent variables. Consequently, IT culture as the second-order variable was directly measured by manifest variables of all first-order constructs (accomplishment needs, affiliation needs, power needs, primary needs, intrinsic motivations, and extrinsic motivations). Furthermore, to ensure better operationalisation of the model, this research uses an equal number of indicators for each construct in the first-order model (Chin 2010).

Measurement model assessment

Our measurement model showed satisfactory reliability and validity. First, we examined the commonly used indicators of Cronbach's alpha (CA) and composite reliability (CR) and average variance extracted (AVE). All the values of CA, CR, and AVE are above the commonly held thresholds of 0.6 (Rahman et al., 2013), 0.7 (Gefen et al., 2000), and 0.5 (Fornell and Larcker, 1981), respectively, indicating adequate reliability for all the constructs. While some of the loadings and CA are less than the recommended cut-off of 0.7, as argued by Loewenthal (2004), they are acceptable as they are above 0.6.

Second, we examined the convergent validity and discriminant validity. We excluded items with loading lower than 0.6 (PI2 and PI3 for personal innovativeness, and PS1, PS2, PS5, and PS7 for successful digital entrepreneurship) from further analysis. Afterward, all the item loadings are

above 0.60 and significant at $p < 0.01$ (as shown in Table II.), indicating adequate convergent validity (Fornell and Larcker, 1981).

Construct	Items	Loadings	AVE	CR	CA
Accomplishment needs	ACC1	0.751			
	ACC2	0.808	0.613	0.826	0.683
	ACC3	0.788			
Affiliation needs	AFF1	0.748			
	AFF2	0.702	0.594	0.813	0.655
	AFF3	0.854			
Extrinsic motivations	EXT1	0.775			
	EXT2	0.779	0.570	0.799	0.622
	EXT3	0.708			
Intrinsic motivations	INT1	0.600			
	INT2	0.790	0.572	0.797	0.617
	INT3	0.855			
Personal innovativeness	PI1	0.824	0.718	0.836	0.609
	PI4	0.870			
Power needs	POW1	0.825			
	POW2	0.612	0.576	0.800	0.634
	POW3	0.820			
Primary needs	PRI1	0.783			
	PRI2	0.651	0.569	0.797	0.637
	PRI3	0.819			
Successful digital entrepreneurship	PS3	0.806			
	PS4	0.797	0.628	0.835	0.705
	PS6	0.775			

Table II. Results of indicators reliability and convergent validity for first-order constructs

Discriminant validity was confirmed according to two criteria. First, as shown in Table III., the square root of AVE of each latent variable was higher than the correlation value of the construct shared with other constructs (Hulland, 1999). Second, as shown in Table IV., each item's loading was higher than all of its cross-loadings (Chin, 1998).

	ACC	AFF	EXT	INT	PI	POW	PRI	SDE
ACC	**0.783**							
AFF	0.584	**0.771**						
EXT	0.709	0.563	**0.755**					
INT	0.560	0.462	0.615	**0.756**				
PI	0.566	0.486	0.526	0.541	**0.847**			
POW	0.436	0.398	0.420	0.327	0.279	**0.759**		
PRI	0.473	0.318	0.524	0.391	0.254	0.443	**0.754**	
SDE	0.518	0.395	0.569	0.550	0.627	0.320	0.231	**0.793**

Table III. Intercorrelations of the latent variables for the first-order constructs

	ACC	AFF	EXT	INT	PI	POW	PRI	SDE
ACC1	**0.751**	0.596	0.508	0.456	0.411	0.331	0.297	0.350
ACC2	**0.808**	0.414	0.593	0.448	0.506	0.365	0.398	0.379
ACC3	**0.788**	0.363	0.558	0.505	0.410	0.327	0.414	0.489
AFF1	0.489	**0.748**	0.402	0.356	0.350	0.267	0.175	0.281
AFF2	0.342	**0.702**	0.374	0.274	0.274	0.344	0.249	0.278
AFF3	0.506	**0.854**	0.513	0.424	0.479	0.316	0.305	0.349
EXT1	0.534	0.529	**0.775**	0.440	0.329	0.294	0.396	0.327
EXT2	0.590	0.362	**0.779**	0.514	0.450	0.330	0.442	0.490
EXT3	0.471	0.383	**0.708**	0.437	0.414	0.330	0.344	0.476
INT1	0.389	0.260	0.322	**0.600**	0.327	0.217	0.238	0.334
INT2	0.425	0.328	0.495	**0.790**	0.416	0.271	0.260	0.473
INT3	0.536	0.437	0.549	**0.855**	0.472	0.256	0.374	0.435
PI1	0.492	0.425	0.420	0.515	**0.824**	0.206	0.201	0.493
PI4	0.470	0.402	0.470	0.411	**0.870**	0.264	0.228	0.567
POW1	0.414	0.388	0.342	0.258	0.227	**0.825**	0.372	0.237
POW2	0.187	0.284	0.201	0.124	0.162	**0.612**	0.147	0.108
POW3	0.350	0.242	0.384	0.327	0.237	**0.820**	0.431	0.342
PRI1	0.371	0.345	0.368	0.296	0.175	0.406	**0.783**	0.120
PRI2	0.142	0.085	0.220	0.105	0.005	0.239	**0.651**	0.019
PRI3	0.467	0.233	0.525	0.402	0.312	0.334	**0.819**	0.327
PS3	0.383	0.247	0.412	0.331	0.505	0.174	0.150	**0.806**
PS4	0.386	0.323	0.478	0.357	0.465	0.305	0.213	**0.797**
PS6	0.456	0.361	0.459	0.598	0.518	0.276	0.185	**0.775**

Table IV. Item loadings and cross-loadings for first-order constructs

As discussed earlier, this research specifies IT culture as a second-order, hierarchical reflective construct comprising six first-order reflective constructs representing 18 items. Thus, the degree of explained variance in this hierarchical construct is reflected in its components, that is, accomplishment needs (73.8%), affiliation needs (54.5%), power needs (40.5%), primary needs (44.6%), intrinsic motivations (57.8%) and extrinsic motivations (74.0%). All the path coefficients from IT culture to its reflective indicators are significant at $p < 0.01$ (see Table V.). The composite reliability and Cronbach's alpha of IT culture are 0.897 and 0.877, respectively, above the cut-off values and provide reliable higher-order measures. We then further validated the measurement model with confirmatory factor analysis (CFA) using AMOS 22. We estimated two IT culture models: (1) the first-order model and (2) the second-order reflective model. The cut-offs are based on Gefen et al. (2011). GFI and AGFI are biased by sample size and degrees of freedom, and there is a consensus against using these indexes to assess model fit (Sharma et al., 2005). Therefore, we focus on using CFI, TLI, and RMSEA. As Table VI. shows, the first-order model fits better than the second-order reflective model. However, the differences are marginal, suggesting that both two models could be valid. We selected the second-order reflective model over the first-order model for three reasons. First, the second-order reflective model is theoretically parsimonious (Cenfetelli and Bassellier, 2009). Second, it avoids the multicollinearity issue if the first-order

constructs are used as independent variables (Koufterosa et al., 2009). Finally, according to Marsh and Hocevar (1985), their study compares CFA of first-order and second-order constructs to decide the fitness with data by calculating the target coefficient T (first-order measurement model χ^2/second-order measurement model χ^2). The T value closer to 1 implies that the second-order CFA can replace the first-order CFA, making the model more precise. Our second-order reflective model's T value is 0.928, which indicates the good fitness of second-order CFA of IT culture. Therefore, this study could take the second-order reflective model to implement structural model analyses.

Table V.
Second-order construct and its association with first-order components

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation	Standard Error	T Statistics (|O/STERR|)
IT culture -> ACC	0.859	0.860	0.020	0.020	43.021
IT culture -> AFF	0.738	0.742	0.041	0.041	17.923
IT culture -> EXT	0.860	0.862	0.016	0.016	52.242
IT culture -> INT	0.760	0.764	0.037	0.037	20.528
IT culture -> POW	0.636	0.638	0.047	0.047	13.660
IT culture -> PRI	0.668	0.670	0.038	0.038	17.726

Table VI.
Confirmatory factor analysis for measurement models

Fit Index	Cut-off	IT culture		CMB CFA test
		First-Order	Second-Order Reflective	
χ^2/df	< 3.000	1.951	1.956	3.799
CFI	> 0.900	0.942	0.942	0.774
TLI	> 0.900	0.903	0.903	0.714
RMSEA	< 0.080	0.056	0.056	0.095
T	> 0.700		0.928	

Since the data came from a single survey, there is the potential for common method bias (CMB). Thus, two complementary analyses were conducted and indicated that common method variance is not a significant concern for this research. First, following Podsakoff et al. (2003), we conducted Harmon's single-factor test by examining the unrotated factor solution involving 23 items of accomplishment needs, affiliation needs, power needs, primary needs, intrinsic motivations, extrinsic motivations, IT culture, personal innovativeness and successful digital entrepreneurship in exploratory factor analysis (EFA). Six factors were identified. The unrotated solution's first factor explains only 29.39% of the total variance, suggesting that common method variance is probably not of serious concern for this study. Second, as an alternative to EFA, confirmatory factor analysis (CFA) can be used when implementing Harmon's single-factor test. In the CFA approach, all the manifested items were modelled as the indicators of a single factor representing method effects. Method biases are assumed to be substantial if the hypothesized model fits the data (Malhotra and Patil, 2006). A CFA model, including the six first-order constructs, was created in AMOS. The results demonstrated that the single factor model fit poorly to the data (χ^2/df = 3.799, CFI = 0.774, TLI = 0.714, RMSEA = 0.095), providing further evidence that CMB did not influence the significance of the results.

Structural model assessment: Hypothesis testing

We then assessed the structural model results by examining the relationships between the constructs and the model's predictive capabilities (Shanmugapriya and Subramanian, 2015). It is essential to check whether any significant collinearity level exists between predictor or explanatory variables in the structural model assessment. A tolerance of less than 0.10 and a variance inflation factor (VIF) of 10 and above indicate a multicollinearity problem (Henseler et al., 2009). By running SPSS linear regression to assess collinearity, the results that all tolerance values are higher than 0.1 and VIF well below the threshold of 10 indicated that collinearity is not high between predictive constructs in this model.

Next, we used the bootstrapping technique in the PLS analysis to examine the structural models for their explanatory power and path significance, using a 3000 bootstrapping sample set and a 5% significance level as a statistical conclusion measure. The model's explanatory power for the dependent construct was measured using the squared multiple correlations value (R^2). In the present study, the independent constructs explained 47% of the variance in achieving successful digital entrepreneurship (DE), which is considered suitable for this analysis. Figure 2. briefs the hypothesized path coefficient values along with the T- statistics values. As per the hypotheses, the IT culture has a significant positive effect on attaining a successful digital entrepreneurship outcome ($\beta = .316$, $p < .001$), thus supporting Hypothesis 1. This result supports the arguments that IT culture is an essential predictor of achieving a successful DE project.

Furthermore, in PLS-SEM, the product-indicator approach is usually employed for the continuous moderator. Therefore, to assess the moderating effect of personal innovativeness on the relationship between IT culture and successful DE, the PLS product-indicator approach (Chin, 2010) was applied. The IT culture (predictor) and personal innovativeness (moderator) were multiplied for creating a new interaction construct to predict DE success (Henseler and Fassott, 2010). As shown in Figure 2., personal innovativeness shows a significant ($p < .05$) but negative ($\beta = -.117$) moderating effect on the relationship between IT culture and successful DE. This result is contradictory to and rejects Hypothesis 2.

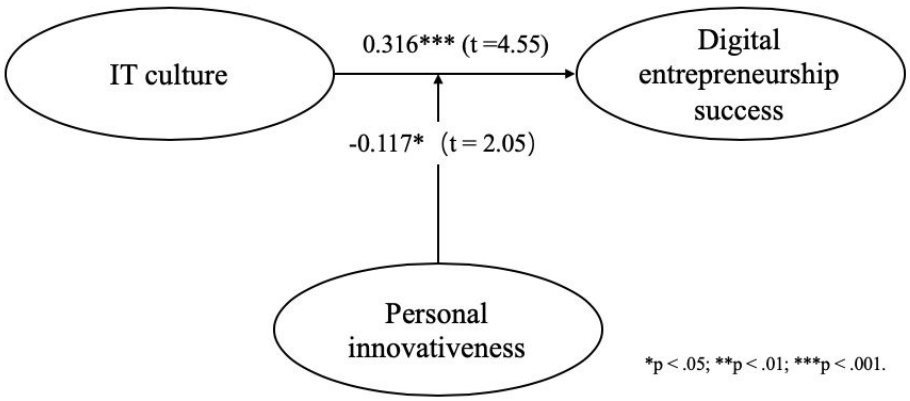

Figure 2. Hypotheses testing results of the hierarchical model

Meanwhile, to explore the moderating effect of experience, which serves as a categorical variable that divides the data into subsamples, Hair et al.'s (2016) recommendation was followed to conduct a between-group PLS analysis instead of the product-indicator approach. The cut-off of experience trait was five years, which is believed to be an appropriate period for an inexperienced digital entrepreneur to become an experienced digital entrepreneur (Leidner and

Kayworth, 2006; Ngoasong, 2017). A tertial split (comparing the top third with the bottom third of the sample) was also used to check the groups' split to ensure subsample balance and discrimination between the two groups. The data was then split into two subsamples based on the level of experience: low-experience DE (M <= 5, n = 210) versus high-experience DE (M > 5, n = 98). A between-group PLS analysis was performed by comparing the difference in coefficient of the corresponding path across different groups using t-test with a pooled standard error (Sia et al., 2009), as shown in Appendix D. The moderating effect of experience is supported. As shown in Table VII., the path coefficient from IT culture to DE success of the low-experience model ($\beta = 0.740$, $p < 0.05$) is significantly weaker ($t_{spooled} = -3.589$) than that of the high-experience model ($\beta = 0.866$, $p < .001$), thus supporting Hypothesis 3.

Table VII. Subsample path comparison statistics

	Path coefficients		Standard Error		
	low-experience	high-experience	low-experience	high-experience	$t_{spooled}$
IT culture -> SED	0.740	0.866	0.310	0.232	-3.589^{***}

To conclude our structural analysis, we calculated the goodness of fit (GoF) of the model using Tenenhaus et al.'s (2005) global fit measure for PLS by computing the geometric mean of the average communality and average R^2 for all endogenous constructs; see Eq. (1). For the PLS path model's global validation, the cut-off values lie between 0 and 1, resulting in GoF small=0.1, GoF medium = 0.25, GoF large = 0.36 (Akter et al., 2011). Following the guidelines of Chin (2010), we obtained the GoF values of this model is 0.30, which indicates that the empirical data fit the model well and has specific predictive power.

$$\text{GoF} = \sqrt{\text{average } R^2 - \text{average communality}} \quad (1)$$

Post hoc analyses

Lastly, we conducted post hoc analyses to explore which specific IT culture will significantly impact successful digital entrepreneurship (DE). We achieve this by decomposing this hierarchical model into IT needs (accomplishment needs, affiliation needs, power needs, and primary needs) and IT motivations (intrinsic motivations and extrinsic motivations) and how personal innovativeness moderates the relationship between them and DE success.

The results are shown in Figure 3. Based on the results, except for power needs, the other three types of needs do not significantly influence DE success. Only the power needs have a significant positive effect on attaining a successful DE outcome ($\beta = .101$, $p < .05$). On the contrary, the path coefficients from both intrinsic and extrinsic motivations to DE success of this decomposed model is positively significant ($\beta = .183$, $p < .01$; $\beta = .274$, $p < .001$, respectively). More specifically, extrinsic motivations have the highest impact on DE success. This decomposed model's research variables account for 51.2% of the variances in achieving a successful DE project, thus providing an adequate prediction.

Table VIII. briefs the moderating effect of personal innovativeness in IT (PPIT). It indicates that except for affiliation needs and power needs, PIIT has negative significant moderating effects on the relationship between accomplishment needs ($\beta = -.112$, $p < .05$), primary needs ($\beta = -.501$, $p < .05$), intrinsic motivations ($\beta = -.154$, $p < .01$) and extrinsic motivations ($\beta = -.890$, $p < .05$) and successful DE.

Meanwhile, we also had an interest in how 'experience' as a moderator will impact the relationship between decomposed IT culture and DE success. By using five years of experience as

a cut-off value, we compared the outcomes for two subsamples. We assessed the measurement model for each subsample first. Item loadings, composite reliabilities, Cronbach's alphas, average variances extracted, and correlations indicated that all these constructs had acceptable reliability levels, convergent validity, and discriminant validity in all cases (Fornell and Larcker, 1981; Sia et al., 2009).

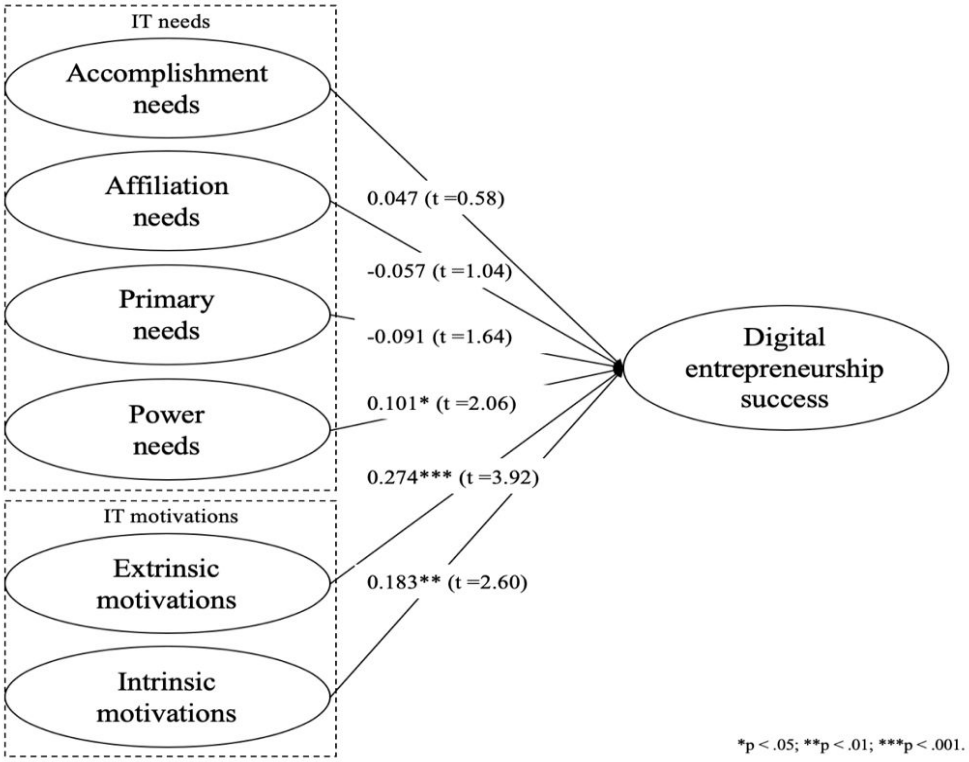

Figure 3. Testing results of the decomposed research model

Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation	Standard Error	T Statistics (|O/STERR|)
ACC * PI -> SED	-0.112	-0.112	0.056	0.056	2.018
AFF * PI -> SED	0.061	-0.008	0.278	0.278	0.221
EXT * PI -> SED	-0.890	-0.859	0.378	0.378	2.351
INT * PI -> SED	-0.154	-0.155	0.054	0.054	2.819
POW * PI -> SED	-0.284	-0.295	0.365	0.365	0.779
PRI * PI -> SED	-0.501	-0.467	0.246	0.246	2.036

Table VIII. Results of the moderating effect of decomposed research mode

As shown in Figures 4. and 5., for the low-experience group, the results are similar to that of the original samples, except that affiliation needs are significantly related to a successful DE outcome ($\beta = .141$, $p < .05$), and power needs is no longer significantly impacting DE success. In addition, both intrinsic and extrinsic motivations still have significant positive impact on DE project success ($\beta = .139$, $p < .01$; $\beta = .221$, $p < .01$, respectively). On the contrary, for the high-experience group, primary needs and power needs are found to be a positive and significant predictor of achieving DE success ($\beta = .158$, $p < .01$; $\beta = .113$, $p < .05$, respectively), and intrinsic motivations are no

longer significantly related to a successful DE project. Still, extrinsic motivations have the highest impact on DE success (β = .169, p < .01) but weaker than that of the low-experience model.

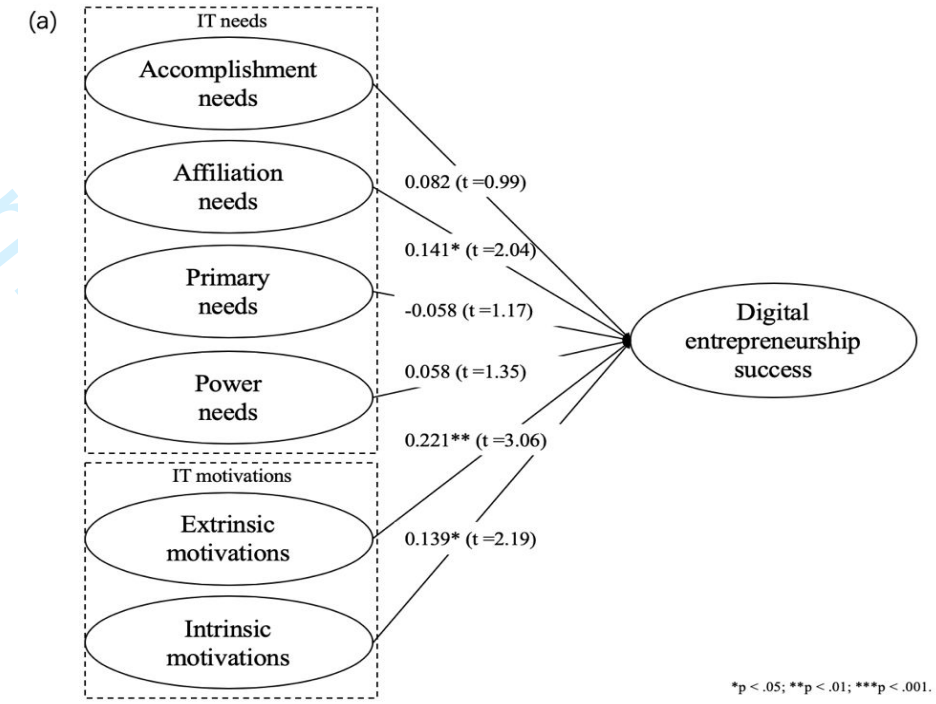

Figure 4. Moderating effect of experience (a) low-experience model (N=210)

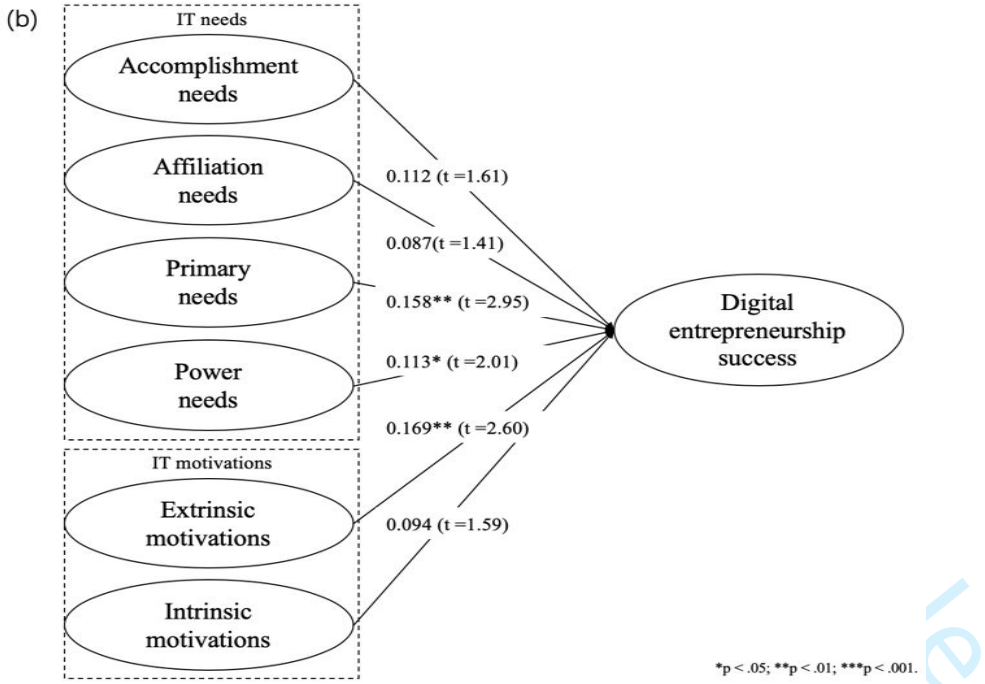

Figure 5. Moderating effect of experience (b) high-experience model (N=98)

Our study has successfully framed IT culture as a second-order hierarchical reflective construct and examining its relationship with personal innovativeness and digital entrepreneurship (DE) success. Our results indicate that for the hierarchical model, IT culture is an essential predictor of

achieving DE success by showing positive and significant path coefficient. Until now, the cultural values framework, based on the needs and motivations (Deci and Ryan, 2008; Rokeach, 1973; Walsh et al., 2014) long-recognised in the managerial literature, has seen limited use in the DE field (cf. Fang et al., 2016). By considering the IT culture theory, this study specifies how digital entrepreneurs shared cultural values through their needs and motivations affect DE success. IT culture, more specifically the cultural values framework, has been a useful tool for researchers because it captures individuals' universal needs and their motivations that are fulfilled (or not) by their appropriation of IT (Walsh et al., 2010; Walsh, 2014). Considering this focus in terms of successful entrepreneurship literature allows us to understand why different types of digital entrepreneurs can experience varying degrees of success in their entrepreneurial projects. This is particularly important because successful entrepreneurship studies and IS studies are concerned with similar issues: digital entrepreneurs' experience regarding skills, knowledge, competencies, and innovativeness. Our research shows digital entrepreneurs experience as a moderator has a positive significant moderating effect on the relationship between IT culture and achieving DE success, which is consistent with IS studies that argue that digital entrepreneurs can learn from prior experiences to develop their competence, expertise, and knowledge required to navigate their digital enterprises to success in a dynamic and complex digital environment (Kollmann et al., 2009; Zaheer et al., 2019).

Other studies argue that IT culture and PIIT directly addresses the notion of the interrelationship between cultural values and personality type (see Meglino and Ravlin, 1998). Nonetheless, our results suggest that success may not always be enhanced when cultural values are interrelationships with personal innovativeness. This is reflected in our study as it shows personal innovativeness, as a moderator, has a negative significant moderating effect on the relationship between IT culture and successful DE. PIIT serves to moderate the relationship between IT culture and DE success. Therefore, IT culture enhances DE success, which is more substantial for digital entrepreneurs with lower PIIT.

Similarly, digital entrepreneurs with higher PIIT would require a less positive IT culture for the same DE success level than digital entrepreneurs with lower PIIT. One plausible explanation is that there may be some interplay or substitute effect of IT culture and PIIT as predictors of behaviours and traits manifested during DE activities. As argued by Parks and Guay (2009), personality is often assessed through traits' behavioural expression. We theorise that the interactive effect of PIIT and IT culture on DE success was negative because decomposed elements of PIIT – 'I support the development of new ideas, I am flexible in the ways I work & I am involved in debates' about differing viewpoints can limit the need to have the control and dominance, aggressive and even ruthless behaviour (power need IT culture) that are sometimes required to achieve DE success. Similarly, the aforementioned decomposed PIIT elements also limit doing what one is excellent at (accomplishment IT culture) as they would be considering many viewpoints that can cause ambiguity, which contradicts the individualist view of entrepreneurship (see Li et al., 2018; Pinvidic, 2018); thus they may find it challenging to overcome the obstacles (accomplishment IT culture) that is required to direct a growing enterprise to success. The literature supports these interpretations. For example, Miller (2015) argues that when entrepreneurs have the quest for achievement and power, they have traits of indifference and mistrust of other people's views that evolve into behaviours of disregarding other peoples' viewpoints and pushing hard their ideas to control and dominate situations to guide their nascent ventures to success (Kets de Vries, 1985; Kets de Vries & Miller, 1984).

5. Conclusion and implications

This study has extended existing Information Systems (IS) and entrepreneurship studies in the context of digital entrepreneurship (DE) by capturing Information Technology (IT) culture regarding IT needs and IT motivations.

Contributions to Theory

Some studies have explored the determinants of DE success, with most of the studies highlighting the role of digital technology (e.g., Boutetiere and Reich, 2018; Steininger, 2019) and the part of the entrepreneurs' social capital and organisational capabilities (e.g., Spiegel et al., 2016; Zaheer et al., 2019). The studies have not explicitly explored digital entrepreneurs' behaviours and traits and the implications for the success of ventures they have developed. This paper provides a step in this direction by exploring the possible relationship between an entrepreneur's IT culture, their innovativeness and experience in IT projects and the implication for achieving a successful DE outcome. Understanding the IT culture and personal innovativeness, and experience in IT projects is vital in explaining the relationships between selected IT cultural values and personal traits that determine DE success. This, in turn, increases our understanding of the factors that are required for successful DE.

Further, by considering PIIT, thought on the role of personality traits and exposure are advanced. Although the PIIT literature has been used extensively in IS, its use in successful DE research has been less frequent. Hence, our study is quite useful. It allows researchers to consider the individual's tendency to be innovative with emerging digital technologies when achieving success in their DE project. This study tests a model based on IT culture, personal innovativeness in IT, and experience in IT projects to explore digital entrepreneurs' behaviour and traits to explain DE success.

This research contributes to the IS and DE literature by augmenting explanations of the theoretical lens - IT culture, and the theoretical construct – PIIT for understanding the phenomenon - DE success. Despite many years of effort, researchers are still not able to articulate and deliver IT culture accurately. IT culture is a multi-layered theoretical lens, far more complicated than it first appears. We examined this theoretical lens in the DE context to provide a novelty perspective to theorise IT culture as a second-order hierarchical reflective construct formed by connecting it to the first-order latent variables (IT needs and IT motivations). This study represents the first attempt to examine whether IT culture can be interpreted as hierarchical latent variables.

Also, this study has advanced existing theories by applying them to a new setting: the DE context. According to Whetten (1989), "the common element in advancing theory development by applying it in new settings…that is, new applications should improve the tool, not merely reaffirm its utility". Consequently, this model explains something new and interesting that allows adequate prediction of the successful DE.

Managerial Implications

Our model offers managers an understanding of how IT culture, personal innovativeness, and experience in IT projects impact achieving digital entrepreneurship (DE) success. Our study's findings support the importance of IT culture, personal innovativeness in IT, and experience in IT projects as critical variables in DE success. Additionally, the results of the post hoc analysis of the decomposed model suggest that managers of digital companies should focus on satisfying power needs and improving both intrinsic and extrinsic motivations first. In particular, enhancing extrinsic motivations will bring the maximum return. Meanwhile, it sheds some light on managers

to treat individuals with different levels of experience differently. It is wise for the low-experience individual to satisfy affiliation needs and both motivations to achieve DE success.

On the contrary, for the high-experience individual, primary needs and power needs must be satisfied first. Furthermore, only extrinsic motivations will count for this type of person. By understanding the cultural values, individuals attribute to digital technologies and their innovativeness will help identify the key individuals who will likely impact DE outcomes. Such individuals can serve as key change agents and opinion leaders to facilitate the success of DE projects. Thus, our study provides managerial implications related to favourable IS strategies. It reveals how companies can develop favourable IT culture and entrepreneurs' innovativeness to enhance workplace innovation. For practitioners, understanding the constructs in the proposed research model is vital to planning, implementing, and adapting DE projects for success. By understanding the main factors affecting DE projects, digital entrepreneurs can adjust their dynamic and fluid innovative and entrepreneurial activities to the individual forces that influence their digitalised work. Our study answers scholars' call (e.g., Fang et al., 2016; Nambisan et al., 2017) to construct more accurate explanations of innovation outcomes in an increasingly digital world.

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Appendix A: Evaluates IT Culture

Constructs	Items
"Affiliation needs", satisfied through the use of digital technologies (DTs) (e.g. analytics, mobile or social media devices): need to socialise and to share with others through DTs medium	Using DTs allow me to stay in touch with my work group and/or with my circle of friends – AFF1
	Using DTs allow me to have exchanges with people with whom I like – AFF2
	With DTs, I can communicate and socialise with people – AFF3
"Accomplishment needs", satisfied through the use DTs: need to overcome obstacles, to do what one is good at, is satisfied through the use of some DTs	I obtain satisfaction when I improve my mastery of the DTs that I use – ACC1
	Mastering new software gives me satisfaction – ACC2
	Even if I have to spend hours mastering the use of new DTs, the satisfaction I get from doing so is worth it – ACC3
"Power needs" satisfied through the use of DTs: need to have prestige, to influence people's behaviours and well-being through one's knowledge and mastery of DTs	I like to show that I have good knowledge about DTs, as this allows me to be better respected by the people I know - POW1
	Being good with DTs gives me some authority with the people that are close to me, and I like that – POW2
	Being good with DTs gives me a feeling of superiority that I like – POW3
"Primary needs", satisfied through usage of DTs: need which is close to an addiction; passion for DTs	When I am using DTs, I don't see time passing by and I find it hard to stop – PRIM1
	I find it hard to control the time that I spend using DTs – PRIM2
	I spend a lot of time using DTs – PRIM3
"Extrinsic motivation", with identified regulation to use DTs: through self-determined choice, one uses DTs because one knows it is important for oneself to achieve other purposes considered necessary for the self; DTs -usage(s) is (are) congruent with one's goals and values.	DTs use improves the quality of my work – EXMOTID1
	I have to use DTs if I want to do some of my tasks correctly – EXMOTID2
	Using DTs allow me to have exchanges with people with whom I work (EXMOTID3)

Intrinsic motivation to know DT (Walsh, 2014): DT usage(s) is (are) motivated to surpass oneself and adequately master one's DT tools.	I like to discover new DTs – INTMOTKNO1 I find some aspects of DTs interesting – INTMOTKNO2 DTs interests me – INTMOTKNO3

Appendix B: Evaluates Personal Innovativeness

Constructs	Items
Personal Innovativeness	I support development of new ideas – PI1 I'm involved in debates about differing viewpoints – PI2 I like to take risks – PI3 I am flexible in the ways I work – PI4

Appendix C: Evaluates Project Success

Constructs	Items
Project Success	I complete my projects within schedule – PS1 I complete the project within budget – PS2 I complete projects according to predefined objectives – PS3 I complete projects according to predefined technical specifications – PS4 I meet the overall expectations for project quality – PS5 I am satisfied with the project's end-product – PS6 My developed projects are in use – PS7

Appendix D: Calculating t-values with a pooled standard error

$$s_{pooled} = \text{sqrt}\{[(N_1-1)/(N_1+N_2-2)] \times SE^2{}_1 + [(N_2-1)/(N_1+N_2-2)] \times SE^2{}_2\}$$

$$t_{spooled} = (PC_1 - PC_2)/[s_{pooled} \times \text{sqrt}(1/N_1 + 1/N_2)] \quad \text{(Goel et al, 2011)}$$

where

s_{pooled}	is the pooled estimator for the variance
$t_{spooled}$	refers to the t-statistic with (N_1+N_2-2) degrees of freedom
N_i	is the sample size of data set for group i (i = 1, 2)
SE_i	is the standard error of path in structural model of group i (i=1,2)
PC_i	is the path coefficient in structural model of group i (i = 1, 2)

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October 26, 2020

Dear Senior Editor and reviewers,

We want to thank you for recommending the publication of our paper subject to addressing the minor revisions. We also thank the review team for all the constructive comments and suggestions. The provided feedback throughout the process has been most helpful in strengthening the paper.

We list the changes that we have made in the following table. We hope that you like the revised version.

Sincerely,

Authors

Comment #	Reviewer 1's Comments	Response
1	This version has addressed all my comments. Thanks for the authors' hard work.	Many thanks for accepting our paper. Your constructive feedback, support, and the opportunity to revise and resubmit the paper significantly strengthen the paper.
	Reviewer 2's Comments	**Response**
1	Thanks for your efforts in improving the paper. The revised paper has been greatly improved. I still have two minor concerns.	Thank you very much for your support and encouraging comments. We have found your feedback extremely useful in developing our revision. We hope that you will find the revised version to offer a stronger draft.
2	Please revise the research model. Since the focus is to understand the moderation effects of personal innovativeness and experience on the link between IT culture and DE success. Please drop H3 from the research model.	Thank you for the comment. We have now dropped hypothesis 3 and removed all arguments related to the development of hypothesis 3.

3	Please add the moderation effects of experience in Figure 2. I don't understand why the moderation effects of personal innovativeness and experience were tested by using two different methods.	Thank you for your comment and suggestion. We used two different methods to test the moderation effects because of the different types of variables. There are two types of moderators in our research model. One is continuous ('personal innovativeness') and the other is categorical ('experience'). According to the book "A PRIMER ON PARTIAL LEAST SQUARES STRUCTURAL EQUATION MODELING (PLS-SEM)", when a moderator is categorical, the variable serves as a grouping variable that divides the data into subsamples. Thus, the model estimates for the subsamples are usually compared using multigroup analysis. On the contrary, in PLS-SEM, the product-indicator approach is usually employed to create an interaction term to estimate the effect of a continuous moderator. Also, corresponding path coefficients and standard errors for the moderating effect of experience are shown in Table VII (p.16) as the same as in Figure 2 (p.15) for personal innovativeness, instead of drawing two group figures to show the results. Thus, we believe there is no need to add the moderation effects of experience in Figure 2, since we already have Table VII to explain the moderation effect of experience. We hope you agree!
4	I hope my comments are helpful.	Yes, we find your comments useful. Thank you for your encouraging words and your continued support throughout this review process.