

Competencies and Capabilities as Determinants of Digital Entrepreneurship: An Empirical Validation

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Competencies and Capabilities as Determinants of Digital Entrepreneurship: An Empirical Validation

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ABSTRACT

This study aims to examine the influence of digital competencies and awareness of digital capabilities on digital entrepreneurial drive in the pre-startup stages of hi-tech businesses. Based on primary data from a sample of 357 respondents, we tested the hypothesized relationships for direct and interactive effects on digital entrepreneurial drive. Our results show that digital competencies and awareness of digital capabilities influence entrepreneurial aspiration and commitment in the pre-startup phase. We use the digital entrepreneurship framework by Recker and von Briel (2019) as the theoretical foundation and demonstrate a novel approach to expand the dimensions of digital enabler, digital outcome, and digital context for further research. We provide unique insights to researchers and practitioners of digital entrepreneurship regarding conceptualizing digital capabilities along with digital competencies. In addition to possessing digital competencies, budding entrepreneurs need to develop a keen awareness of digital capabilities to understand the changing dynamics of the entrepreneurial landscape.

Keywords: Digital entrepreneurship, digital competencies, digital capabilities, entrepreneurial drive

INTRODUCTION

The emergence of digital entrepreneurship, which is the intersection of digital technology and entrepreneurship, is inevitable given the rapid development and evolution of digital technologies. In a global economy with connected business ecosystems, this topic is of interest to researchers, business leaders and policy makers. For instance, reports indicate that the majority of global unicorns (these are start-ups that are valued at more than \$1 billion) are digital start-ups (Recker and von Briel, 2019; CB Insights, 2019). Our exposure to digital devices and platforms such as 5G networks, social media, Internet of Things (IoT), robotics, driverless vehicles, self-maintenance equipment, and Artificial Intelligence has become increasingly pervasive in all walks of life. Zealous entrepreneurs would be eager to enter this field and discover the range of opportunities available to them.

Although a substantial body of research is available on the risks and uncertainties of start-up businesses, there is a lack of literature on how these would apply to digital entrepreneurship. In particular, the pre-start-up phase in entrepreneurship, which is of interest to researchers and entrepreneurial enthusiasts, is still under-researched. In this study we seek to explore some of the determinants of entrepreneurial drive which would be required for digital start-ups. Extant research has shown that digital technologies will shape innovation in entrepreneurial activities (George et al., 2021, Reis et al., 2021) and identified the former as critical success factors (Bachmann et al., 2024). Hence, we argue that the entrepreneurial drive will be influenced by one's knowledge in the digital field and an understanding of its potential for innovation. The primary research question for this study is "What factors influence the digital entrepreneurial drive of the individual?" We propose two factors: digital competencies and the awareness of digital capabilities that an individual might possess as they strive to succeed in the entrepreneurial world.

It is broadly acknowledged that digital technologies can have significant effects on entrepreneurial processes. However, most of the existing research in digital entrepreneurship is mainly focused on doing empirical work in technology-intensive environments (Zupic, 2014). In addition to viewing technology as merely a context for entrepreneurship (Vissa & Bhagavatula, 2012), we intend to extend the research spectrum to include concepts related to digital technologies which influence entrepreneurial drive. The motivation for this study stems from the fact that research scholars (e.g., Nambisan, 2017) are pointing out that more work needs to be done on specific aspects of digital technologies which can shape "entrepreneurial opportunities, actions, and outcomes" (p. 1030). In their comprehensive study on the evolution of digital entrepreneurship, Violetta et al.,

(2021) suggest that further insights are needed for the current issues and challenges in this discipline.

The rest of the paper is organized as follows. In Section 2, we describe the conceptualization and literature review of the main concepts of this study. It is followed by a presentation of the research model, hypotheses, and methodology in Section 3. Section 4 covers the detailed data analysis followed by results in Section 5. We discuss our results, theoretical and managerial implications in Section 6. In Section 7 we reflect on the limitations of the study, provide suggestions for future research and our concluding remarks.

CONCEPTUAL BACKGROUND AND LITERATURE REVIEW

Digital Entrepreneurship

The contemporary digital age has significantly transformed the entrepreneurial landscape, prompting profound shifts in how entrepreneurs conceive and pursue opportunities. One prevailing debate is focused on the dynamic interplay between digital technologies and entrepreneurial activities. The emphasis on digital aspects of business leading to new (entrepreneurial) value creation has led to discussions on the strategic integration of digital capabilities in fostering innovation, competitive advantage, and growth (Chesbrough, 2010; Zahra et al., 2009). Scholars and practitioners alike have been engaging in dialogues surrounding the evolving nature of entrepreneurial competencies and capabilities in this digital era. Although much progress has been achieved conceptually, there is a paucity of empirical research on validating these conceptual extensions.

Our paper extends this discourse by empirically validating the Recker and von Briel (2019) Digital Entrepreneurship Framework in the context of digital competencies and capabilities. The emergence of digital entrepreneurship is viewed as the intersection of digital technologies and entrepreneurship (Recker and von Briel, 2019). The term “digital” in entrepreneurship relates to start-ups and ventures that offer a product or service which either contain elements of information and communication technologies (ICT) or are enabled by them (von Briel, Recker, et al., 2018). Building on the evolving developments in this field, we adopt the definition of digital entrepreneurship as “entrepreneurship in which digital artifacts and digital platforms form the core of NVIs and new market offerings, which are cultivated and distributed via external enabling digital infrastructures” (Nzembayie and Buckley, 2022, p. 47).

One aspect of digital entrepreneurship is the design, development, implementation, and use of digital technologies in start-ups and commercial ventures. Another aspect which is perhaps more important is *how digital technologies and entrepreneurial processes can interact with each other* and presumably influence each other (Recker and von Briel, 2019). Reports indicate that four of the world's five most valuable companies (Badenhausen, 2016) are Apple, Google, Microsoft, and Amazon. Interestingly they were initiated as digital start-ups but currently offer products and services which are vastly dependent upon processes driven by digital technologies. Digital technologies can substantially impact entrepreneurial processes and thereby the intended outcomes (cf. Nambisan, 2017; Nambisan et al., 2017; Tiwana et al., 2010; Yoo et al., 2010). For example, recent studies have shown how digital technologies can improve process integration and dynamic capabilities in healthcare (Chakravorty et al., 2020). Current research on this aspect is in its nascent stages and we aim to explore it empirically in this study.

Aiming at digital entrepreneurship processes, Recker and von Briel (2019) propose a framework wherein digital aspects are assigned to three dimensions: as **enabler** (digital enablers of entrepreneurial processes), **outcome** (digital outcomes of entrepreneurial processes), or **context** (in which entrepreneurial processes take place). Digital technologies that act as enablers have the potential to *change* and *influence* entrepreneurial action, processes, and outcome (Davidsson et al., 2018; von Briel, Davidsson, et al., 2018; Nambisan, 2017). Digital technologies act as an outcome of entrepreneurial pursuits when they *create* digital technologies as the service or product of their market offering (von Briel, Recker et al., 2018; Lyytinen et al., 2016). The third dimension is concerned with digital technologies that can influence broader *contexts* of entrepreneurship or establish digital ecosystems wherein entrepreneurial processes are created (Autio et al., 2018; von Briel, Davidsson, et al., 2018).

Adopting an integrative approach in our study, we conceptualize two factors that can impact the entrepreneurial drive of an individual pursuing digital entrepreneurship ventures: **digital competencies** (i.e., knowledge, skills, training, and experience in a particular field of digital technologies) and **awareness of digital capabilities** (i.e., understanding the importance and potential of digital technologies from strategic and operational perspectives). Using the digital entrepreneurship framework mentioned above as the conceptual lens, we assign the *digital competencies* construct in the intersection of dimensions for digital “outcome” and “enabler” and *awareness of digital capabilities* in the intersection of digital “enabler” and “context”. In our study, we intend to elaborate how these

extensions to the model enhance its value and usability from theoretical as well as practitioner perspectives.

In the following sections we elaborate further on these constructs which are central to our research model.

Digital Competencies

In the context of this study, we refer to **digital competencies** as the technology and management skills dealing with computer hardware, software, communication networks and data (Pearlson et al., 2019; Oberländer et al., 2020). Studies have shown the importance of perceived entrepreneurial competencies which can influence entrepreneurial behavior (e.g., González-López et al., 2021). Such research studies have explored entrepreneurial competencies in general (e.g., Mitchelmore and Rowley, 2013; Churchill and Lewis, 1983; Markman et al., 2002) but do not particularly examine digital competencies. Extant literature has collectively characterized digital technologies such as social media, Mobile applications, Analytics, Cloud computing, and the Internet of Things as SMACIT (Ross, 2014). Other dimensions for digital competencies have been suggested (e.g., Oberländer et al., 2020), along with IT organizational skills such as business systems design, data capture, technology architecture planning, and business processes integration (Reuber and Fische, 2011).

In addition to basic computing skills, digital competencies also include specialized and advanced knowledge and training one can acquire in educational institutions such as business analytics, artificial intelligence, accounting software like QuickBooks, social media apps development, and so on. Hi-tech entrepreneurs will tend to identify opportunities based on the use of the internet, World Wide Web (WWW), mobile technologies, digital media and other forms of ICT, and coding to create new apps (Richter et al., 2017). These skills are generally acquired through formal education (university/college degrees), training (e.g., professional certificate programs or self-study) and experience in disciplines like computer science or information systems and management (Ngoasong, 2018). Research (e.g., Alderete and Gutierrez, 2014) shows users' related education and knowledge in technologies is positively associated with their adoption of those technologies in their businesses. On the other hand, organizations may not be able to realize the benefits of technologies due to their lack of technological know-how (Vidhyalakshmi and Kumar, 2016).

Our motivation is to unravel what drives the entrepreneurial spirit in the digital world in addition to possession of digital competencies. Beyond the

possession of digital competencies, *being aware* of their importance in digital entrepreneurship is also critical (Autio et al., 2018). Hence, we develop the concept of awareness of the digital capabilities which we elaborate in the next section.

Awareness of Digital Capabilities

Aspiring entrepreneurs, driven by their passion and desire, will attempt to acquire the knowledge that is complementary to digital competencies (Manolova et al., 2007; Marvel, 2011), such as the capabilities which might prove profitable in a digital enterprise. In this study, **awareness of the digital capabilities** refers to understanding the strategic importance of information and communication technologies (ICT) and leveraging the operational potential of these technologies for an entrepreneurial process. Seamless technology-business alignment provides enterprises with superior performance and value creation opportunities (Puspitasari and Jie, 2020). Strategic orientation is essential for the entrepreneurial mindset of the individual for developing decision-making and risk-taking styles and practices (Wiklund and Shepherd, 2005; Wales et al., 2011; Wang, 2008). This awareness will lead one to sense, discover and seize opportunities in a timely manner and develop planning processes to create future products and services (Teece, 2007; Shane and Venkataraman, 2000).

To explain the relationship between entrepreneurial drive and the potential antecedent (awareness of digital capabilities), we draw on the established *technology affordances and constraints theory* (Leonardi, 2011; Majchrzak & Markus, 2013). This theory suggests that awareness leads to an action potential that is offered and depends on the relation between a technology with certain features and a user's intent or purpose for which this technology is to be used. Through greater awareness of digital capabilities, the entrepreneur can foresee and articulate different outcomes and provisions for the user through the same digital platform (Autio et al., 2018). A successful entrepreneur needs to be aware of the digital capabilities in relation to a particular industry or application that leads to context formation and recognition (Liu et al., 2011). We believe that the distinction between general and specialized digital capabilities is important in the nascent stages of entrepreneurship to formulate a context-based application. Thereby the individual is able to assess the challenges and risks and benefit from integrating context-specific opportunities (Ngoasong, 2018). We note below examples of diverse applications and research evidence how this awareness can contribute to novel value propositions for the technology user in terms of different outcomes, personal and recreational applications, economic feasibility, and fulfilling experiences.

The emergence of ubiquitous computing in daily activities (Yoo, 2010) has offered new opportunities to digital entrepreneurship enthusiasts. Embedded computing capabilities (Lyytinen and Yoo, 2002) are now being placed into devices (e.g., smartphones) and commonly used consumer products such as televisions, refrigerators, and sporting equipment and gear. Computers are no longer being used just for specialized functions; instead, people use them for everyday personal and recreational activities as well. Thus, entrepreneurial acumen will depend on how well the digital capabilities can be effectively integrated from the technological perspective so the products will become feasible.

With the phenomenal growth in communication and networking systems, noticeably the use of sensor networks, Radio Frequency Identification (RFID), Internet of Things (IOTs), and Global Positioning Systems (GPS) have become pervasive. This can touch many aspects of our everyday lives. For example, automobile design and manufacture now includes integrating digital technologies for navigation, entertainment, failure alerts, and warning messages with the current platforms (Henfridsson and Lindgren, 2005). Vehicle owners are being offered services related to maintenance, safety, and insurance as the technological capabilities are being extended. Thus, entrepreneurs will be able to tap into opportunities which can change the manner in which users can interact with the current environment for a more satisfying and enriching experience.

To summarize, a given digital artifact can be employed in different settings and contexts which can create novel solutions in the eyes of the entrepreneur (Nambisan, 2016). Studies have investigated the importance of digital capabilities and their impact on adoption of emerging technologies (Brunner et al., 2021). Furthermore, the entrepreneur needs to have a deeper appreciation for the context of the digital artifact and user needs and expectations. This awareness of the digital capabilities will prompt the entrepreneur to seek varied applications for the artifact effectively leading to different opportunities.

Digital Entrepreneurial Drive

The goals and outcomes of most entrepreneurial pursuits are ambiguous and changing (March, 1982) and often not known at the offset. In the face of uncertainty, entrepreneurs do not try to reach an outcome that was preselected; on the contrary they *create opportunities* and *control the future* (i.e., outcome) through their choices and actions (Sarasvathy et al., 2003). Their individual desires, abilities, and preferences affect their entrepreneurial intentions (Yamini et al., 2022) and they begin to develop the knowledge and social connections they see as necessary at that time (Cardon et al., 2009, p. 511).

In the context of our research, we treat digital entrepreneurial drive as the force required to carry forward with the startup leveraging digital technologies, platforms, and the internet to deliver value to customers, generate revenue, and achieve sustainable growth. For example, mere presence of online tools and high-speed bandwidth may provide the impetus to start online trading of goods and services across international boundaries. Both market innovations (finding new markets) and technology innovations (finding new applications) can stem from digital entrepreneurial drive. Entrepreneurial drive becomes an emotional energy (Goss, 2005) that gives individuals a sense of “pleasure and promise” (Rockwell, 2002, p. 52) and commits them “wholeheartedly with what ... [they] love” (Belitz & Lundstrom, 1997, p. 57). This drive triggers a natural toughness to stick to their aspirational goals involved in venturing and an unwavering commitment to initially set goals (Baum & Locke, 2004), even to the extent of becoming less sensitive to contrary information (Cova and Svanfeldt, 1993, p. 308).

Thus, we converge on two related yet distinct dimensions in which entrepreneurial drive manifests: (1) aspirational and (2) commitment energy. This is especially applicable in nascent stages of entrepreneurship. In pre-startup financing by Angel investors and venture capitalists, the entrepreneurial drive of the founders as expressed in their aspirations and commitment is the most important criterion (examples include Sun Microsystems, Apple, Amazon, Medtronic, and Boston Scientific from 1980s and more recently Khan Academy, Instagram, Stripe, Cameo and other unicorn companies in the Internet era) (Pitchbook Data, 2021). A practical example in seed and pre-seed funding, the ethos of Sequoia Venture Fund is more about the aspirational drive and intensity of commitment in the founders and not the imperfection of a new venture (Sequoia, 2021). Even though the aspirational energy will generate novel ideas (for new products and services), commitment in the form of sustained attention and intention will be needed for them to become manifest (Bird, 1988).

Theorists have suggested that domain-specific expert knowledge may be seen by some as being used to make entrepreneurial decisions when faced with uncertainty (McKelvie et al., 2011). Since the entrepreneurial outcome is not always well defined, such decisions may be risk prone. We suggest that in addition to “expert knowledge” (i.e., digital competencies), the awareness of the digital capabilities (e.g., dependencies of the product or service on the digital platform and customer preferences) would be necessary to balance the rashness that may otherwise ensue due to this approach of decision-making. In this study we seek to explore to what extent these two constructs can shape the individual’s drive for entrepreneurship.

The above literature review guides us to the research model presented in the next section. Possession of digital competencies and awareness of digital capabilities have both direct and interacting effects on digital entrepreneurial drive. Hypotheses follow the research model.

RESEARCH MODEL AND HYPOTHESES

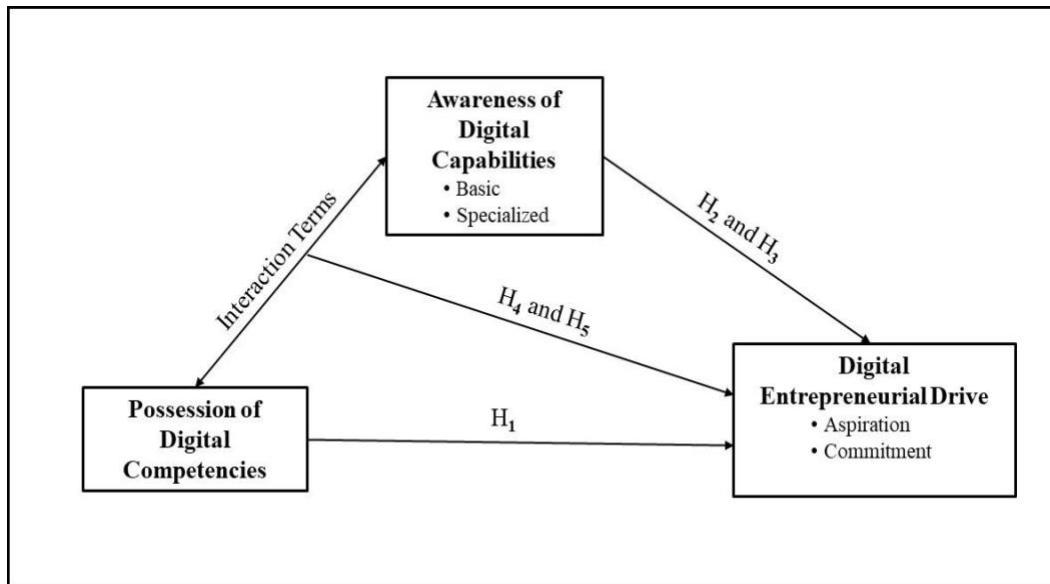


Figure 1. The Research Model

Research Hypotheses

Stemming from the conceptualization and the research model, we develop the following hypotheses for direct effects. When an individual possesses digital competencies (i.e., technology and management skills), the entrepreneurial drive is often kindled. During education and training programs, such individuals will learn about entrepreneurship and have access to networking opportunities with fellow entrepreneurs. In times of uncertainty, they will know how to use domain-specific knowledge to make entrepreneurial decisions (McKelvie et al., 2011). Initially the aspirational energy will serve to spark creative ideas for new digital products and services followed by commitment in the form of sustained attention to develop and implement the novel ideas (Bird, 1988). Having competencies not only ignites entrepreneurial drive but also fosters a deep commitment, propelling individuals to persistently pursue their innovative ideas and navigate challenges with resilience

and determination (Eisenmann, et al., 2006). Thus, we expect a direct effect of possession of digital competencies on entrepreneurial drive.

Direct Effects

H1.1: Possession of digital competencies positively impacts digital entrepreneurial drive [Aspiration].

H1.2: Possession of digital competencies positively impacts digital entrepreneurial drive [Commitment to start].

In addition to digital competencies, the awareness of digital capabilities will make the individual curious and passionate about digital entrepreneurship. For instance, a strategic orientation of information and communication technologies will develop certain decision-making and risk-taking styles and practices in the entrepreneurial mindset (Wiklund and Shepherd, 2005; Wales et al., 2011). Also, the individual will begin to sense and discover opportunities to develop processes for creating digital products and services (Teece, 2007; Shane and Venkataraman, 2000). Digital entrepreneurs need to have a broad understanding of the users of the technologies and their transformative power. Thereby they can envision the opportunities which can change the manner in which the users can interact with the current environment to provide a more satisfying and enriching experience. Given a particular digital artifact and platform, such an entrepreneur can foresee and articulate different outcomes and provisions for the user (Autio et al., 2018).

Hence, we expect a direct effect of awareness of digital capabilities on entrepreneurial drive. We propose the following hypotheses for the direct effects of awareness of digital capabilities.

H2.1: Awareness of digital capabilities (basic) positively impacts digital entrepreneurial drive [Aspiration].

H2.2: Awareness of digital capabilities (basic) positively impacts digital entrepreneurial drive [Commitment to start].

H3.1: Awareness of digital capabilities (specialized) positively impacts digital entrepreneurial drive [Aspirational].

H3.2: Awareness of digital capabilities (specialized) positively impacts digital entrepreneurial drive [Commitment to start].

Interaction effects are defined as the effects of independent variables working in concert affecting the dependent variable (Frost, 2021). Possession of digital competencies alone is not sufficient to start (aspiration) and sustain (commitment) the entrepreneurial journey. Individuals possessing digital competencies may not be aware of their potential for entrepreneurship. The awareness of digital capabilities in the form of understanding the strategic importance and operational potential of the technologies will be required to implement novel ideas.

When an individual possesses digital competencies and is also aware of the digital capabilities, we can expect that there will be an amplification in the *entrepreneurial drive*. Conversely, when the individual possesses a low degree of digital competencies and is only weakly aware of the digital capabilities, we can expect a diminishing effect on the entrepreneurial drive.

Hence, we can expect an interaction effect from the possession of digital competencies and awareness of digital capabilities on entrepreneurial drive and how it can influence aspiration and commitment. We propose the following research hypotheses for the interaction effects.

Interaction Effects

H4.1: *Awareness of digital capabilities (basic) mediates the relationship between possession of digital competencies and digital entrepreneurial drive [Aspirational].*

H4.2: *Awareness of digital capabilities (basic) mediates the relationship between possession of digital competencies and digital entrepreneurial drive [Commitment to start].*

H5.1: *Awareness of digital capabilities (specialized) mediates the relationship between possession of digital competencies and digital entrepreneurial drive [Aspirational].*

H5.2: *Awareness of digital capabilities (specialized) mediates the relationship between possession of digital competencies and digital entrepreneurial drive [Commitment to start].*

DATA COLLECTION SAMPLE AND MEASURES

Data Collection

The data for our study is drawn from the largest cross sectional, state-level survey ever conducted in the United States in nascent entrepreneurship with a focus on factors that contribute to entrepreneurial drive. The survey was supported by a University Research Grant that funded an empirical study on barriers and catalysts in pre-startup phases of entrepreneurship. The data collection effort was led by the authors and managed by a third-party, Qualtrics, which was contracted to collect 1200 completed surveys. The survey collected data on critical variables related to the broader phenomenon of nascent entrepreneurship (Mujtaba et al., 2020; Cavich and Chinta, 2021) and digital entrepreneurship emerged as a prominent theme for investigation. Qualtrics utilized one or more research organizations who maintain respondent panels and these panels represent the sampling frame.

Respondents were identified by asking two filter questions that were used to eliminate respondents who did not possess the desired characteristics. First, Florida residency was required to be a respondent, and second, respondents should not have started a business before and should not be currently self-employed. As of this writing, potential entrepreneurs who do not have prior entrepreneurial experience and are currently intending to start a business have not been researched in the state of Florida. Therefore, we chose to focus on this under-researched population in Florida.

Measurement of Variables

The pre-test for the survey instrument involved 30 respondents (convenience sampling) and the procedure used to develop the final instrument (Cavich and Chinta, 2021) is briefly described here. In the pre-test, several questions were drawn from extant literature (Krueger and Brazeal, 1994; Seo et al., 2004; Schwarz and Clore, 2007; Cardon et al., 2009; Neville et al., 2018) that measured each of the research variables. The initial pre-test version of the survey had more than 90 questions; the responses were first grouped under conceptual validity (groups of questions tapping into the same construct), then factor analyses were done to identify the variable that loaded the strongest on the construct being measured (dimensions reduction). The questionnaire was finally pared down to 55 questions. All variables in this study were measured along a 7-point Likert scale, from “strongly disagree to strongly agree”, with higher numbers indicating agreement (Cavich and Chinta, 2021).

The dependent variable, Digital Entrepreneurial Drive, was measured by asking the respondents two separate questions, one for aspiration and the other for commitment of the respondent to engage in digital entrepreneurship. These two questions were (1) “*Starting a new business would be one of my important accomplishments in my life*” and (2) “*The strength of my commitment to start a business is (very weak to very strong on a 7-point scale).*” Possession of Digital Competencies was measured by asking the respondents, “*I am confident about my computer skills (e.g., Excel, data mining, business analytics, digital business, social media, accounting software like QuickBooks) necessary to start a new business.*” The Awareness of Digital Capabilities for digital startups was measured by asking two questions: one for awareness of basic digital capabilities and the other for the awareness of specialized digital capabilities such as business intelligence and analytics. These two questions were (1) “*Nowadays computer skills (Excel, data mining, digital business, social media, accounting software like QuickBooks, etc.) are necessary to succeed in a new business.*” and (2) “*Business intelligence/analytics functions from a strategic perspective are important to stay competitive in the current business environment.*” We also collected demographic data such as age, sex, education, work experience, marital status, and family size.

The above stated measurement of variables may suffer from less reliable single-item measures. While Bergkvist and Rossiter (2007) found that multiple-item measures generally exhibit higher reliability and validity compared to single-item measures, they also note that in certain cases, single-item measures can still provide valuable insights, particularly when resources are limited or when the construct being measured is relatively simple. Given that our large survey already had 56 questions, we did not have the luxury of measuring our research variables using multiple questions.

Sample Characteristics

The total usable sample size from the survey was 1246. Based on the type of businesses that were intended to start, we divided the total sample into three groups, namely, Group (1) [Hi-Technology (Internet business)], Group (2) [Hi-Technology (genomics, robotics, AI algorithms, super materials)], and Group (3) [Non-tech (Food franchise, salon, cleaning services, sub-contractor, etc.)]. The number of respondents for the three groups are 295, 62 and 889 for Groups 1, 2 and 3 respectively. Our analysis is focused on the combined sample of Groups 1 and 2, which is a sample size of 357 for our study.

The research sample consisted of (1) male (59%) and female (41%); (2) mean age of 39 years with a range from 18 to 70; (3) education at doctoral (6%), graduate

(28%), undergraduate (52%), high school and below (14%); **(4)** married (56%), single (35%), divorced (7%), widowed (2%); **(5)** mean work experience of 16 years; **(6)** mean number of family members in the household of 2.9; **(7)** mean number of people in the household who are employed outside the home of 2.2; **(8)** necessity-driven entrepreneurs (29%) and opportunity-driven entrepreneurs (71%).

RESULTS

Following the research model in Figure 1, this is the data analyses to test the five hypotheses outlined earlier. We first present the descriptive statistics and bivariate correlations of the five variables in Table 1.

Table 1. Descriptive Statistics and Correlations

	Mean	SD	Q26	Q27	Q28	Q23	Q38
Awareness1 (Q26)	5.79	1.39	1	.525***	.554***	.397**	.213**
Competencies (Q27)	5.76	1.43		1	.572***	.269**	.257**
Awareness2 (Q28)	5.93	1.20			1	.315**	.233**
Aspiration (Q23)	6.08	1.35				1	.294**
Commitment (Q38)	5.97	1.41					1
*p<0.10, **p<0.05, ***p<0.01							

Results in Table 1 reveal a right skewed distribution for the measured variables given the 7-point Likert scale measurement. For a study focused on digital entrepreneurship, this is to be expected that our research sample consists of Group 1 [Hi Technology (Internet business)] and Group 2 [Hi Technology (genomics, robotics, AI algorithms, super materials)], and excludes Group 3 [Non-tech (Food franchise, saloon, cleaning services, sub-contractor, etc.)]. Group 3 (Non-Tech) sample size is 889, while our research sample is 357. All the bi-variate correlations among the five research variables are statistically significant. However, there are some differences in the strength of the correlations among some pairs of variables. For example, the correlation between digital entrepreneurial drive [Aspiration (Q23)] and digital entrepreneurial drive [Commitment (Q38)] is weaker than that between the two measures of Awareness of Digital Capabilities [Awareness1 (Q26)] and [Awareness2 (Q28)]. The implication of the difference is that digital entrepreneurial drive is multidimensional and Aspiration (Henley, 2007, p. 255)

and Commitment (Markovitch et al., 2014, p. 303 and Sahabuddin, 2018, p. 68) may be sub-measures of the broader construct of entrepreneurial drive. Thus, the choice of treating Aspiration and Commitment as separate dependent variables in regression analyses allows a more nuanced understanding of digital entrepreneurial drive. We present these separate regressions next in Tables 2 and 3 which are used for testing hypotheses 1 to 5.

Table 2 shows the results of a regression model in which digital entrepreneurial drive [Aspiration (Q23)] as the dependent variable, and the three independent variables are “Possession of digital competencies (Q27)”, “Awareness of basic digital capabilities [Awareness1 (Q26),” and “Awareness of specialized digital capabilities [Awareness2 (Q28).” Two additional interaction terms are also added to the independent variables set to test the significance of interaction effects (Frost, 2021). We found no problem of multicollinearity among the independent variables as the collinearity diagnostics in SPSS showed VIF (Variation Inflation Factor) to be below 1.5 for all the independent variables (Craney and Surles, 2002, p. 393).

In addition to showing the statistically significant and insignificant beta coefficients, R-squared, F-statistic, degrees of freedom and sample size for the two models, Durbin-Watson statistic is also displayed in Table 2. The Durbin-Watson statistic shows the degree of auto-correlation in the residuals in a given regression and has a value that is always between 0 and 4. A value of 2 or near 2 means that there is little or no autocorrelation (Durbin Watson, 2021). A value between 1 and 2 means positive correlation, and a value of 2 to 4 indicates negative autocorrelation. Results in Table 2 indicate the direct effects are all significant, but the interaction terms do not have any statistically significant impact on the digital entrepreneurial drive [Aspiration (Q23)]. In terms of relative weights of the direct effects, “Possession of digital competencies (Q27)” has the highest explanatory power, and “Awareness of specialized digital capabilities [Awareness2 (Q28)” has relatively the least impact on the dependent variable, though all the three direct effects are close in terms of magnitude. Thus, **H_{1.1}, H_{2.1} and H_{3.1} are supported, and H_{4.1} and H_{5.1} are not supported.**

Table 2. Regression Coefficients* - Dependent Variable: Aspiration

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Relative weights of significant variables
	B	Std. Error	Beta			
(Constant)	2.106	.746		2.822	.005	
Awareness1 (Q26)	.317	.158	.327**	2.003	.046	33.1%
Competencies (Q27)	.316	.160	.329**	1.972	.049	35.3%
Awareness2 (Q28)	.349	.172	.306**	2.024	.044	31.6%
Interaction term (Q27_Q26)	-.005	.029	-.049	-.183	.855	
Interaction term (Q27_Q28)	-.045	.033	-.389	-1.356	.176	
R ² = .181						
F-statistic = 15.290***						
Degrees of freedom = 5						
N = 351						
Durbin-Watson Statistic = 1.904						
*p<0.10, **p<0.05, ***p<0.01						

Table 3. Regression Coefficients* - Dependent Variable: Commitment

Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Relative weights of significant variables
	B	Std. Error	Beta			
(Constant)	5.039	.815		6.179	.000	
Awareness1 (Q26)	.271	.173	.268	1.571	.117	
Competencies (Q27)	.095	.175	-.095	-.544	.587	
Awareness2 (Q28)	-.321	.188	-.271*	-1.703	.089	25.9%
Interaction term (Q27_Q26)	-.043	.032	-.375	-1.337	.182	
Interaction term (Q27_Q28)	.093	.036	.777**	2.571	.011	74.1%
R ² = .103						
F-statistic = 8.008***						

Degrees of freedom = 5
N = 353
Durbin-Watson Statistic = 1.934
*p<0.10, **p<0.05, ***p<0.01

Table 3, in the same format as Table 2, shows the results of a regression model in which digital entrepreneurial drive [Commitment(Q38)] as the dependent variable, and the three independent variables are “Possession of digital competencies (Q27)”, “Awareness of general digital capabilities [Awareness1 (Q26),” and “Awareness of specialized digital capabilities [Awareness2 (Q28)].” Two additional interaction terms are also added to the independent variables set to test the significance of interaction effects. Results in Table 3 indicate that one of the three direct effects is significant, which is that of “Awareness of specialized digital capabilities [Awareness2 (Q28)]” which has a negative beta coefficient. Among the two interaction terms, one is significant, which is the interaction between “Possession of digital competencies (Q27)” and “Awareness of specialized digital capabilities [Awareness2 (Q28)].” In terms of the relative weights of the statistically significant variables on their explanatory power, it is interesting to note that the interaction effect has 74.1% or nearly three times the explanatory power than the direct effect which has only 25.9% weight in a predictive regression model. In summary, **H_{3.2} and H_{5.2} are supported, and H_{1.2}, H_{2.2}, and H_{4.2} are not supported.**

DISCUSSION

Theoretical Implications

Our work attempts to unravel factors which can impact an individual’s drive towards digital entrepreneurship. Though there can be several factors, we chose to focus on two which are central to our research model, namely digital competencies, and awareness of digital capabilities. Scholars have indicated the importance of entrepreneurial competencies in this research stream (González-López et al., 2021). We now reflect on the implications of the detailed analysis of the results which were described in the previous section.

For drivers of Aspiration, all three independent variables have a significant impact as we expected. Aspirants of digital entrepreneurship are likely to have higher degrees of digital competencies and awareness of digital capabilities. However, we note that the interactive effects were not significant. Yet this indicates that digital competencies and awareness of digital capabilities can influence aspiring digital entrepreneurs. Our findings are aligned with prior research which states that if entrepreneurs perceive that they possess the (digital) competencies, they are more

likely to believe that opportunities exist (Mitchelmore and Rowley, 2013), thus augmenting their entrepreneurial drive. Studies have shown that digital capabilities fueled by innovation can be a distinctive competency for firms (e.g., Feng-Jyh et al., 2021).

In the case of Commitment, the results are nuanced and interesting. The variable for Awareness of Digital Capabilities (Specialized) has a significant negative impact on Commitment which indicates that an increased awareness of such digital capabilities will result in reduced commitment. This might imply that increased awareness may lead to less confidence in digital start-ups particularly when dealing with specialized ICT skills and applications. Even more insightful is the finding for the interaction effect between Possession of Digital Competencies and the Awareness of Digital Capabilities (Specialized) which is significant. The lack of confidence arising from awareness is more than offset by the possession of digital competencies. Our assessment is that when considering specialized digital entrepreneurial pursuits, while awareness of digital capabilities alone leads to reticence, the possession of the digital competencies will lead to confidence and commitment. It indicates that such committed entrepreneurs will pursue activities for acquiring digital competencies. At the time of this writing, we believe this finding is new and has deeper implications for research and practice which we elaborate below.

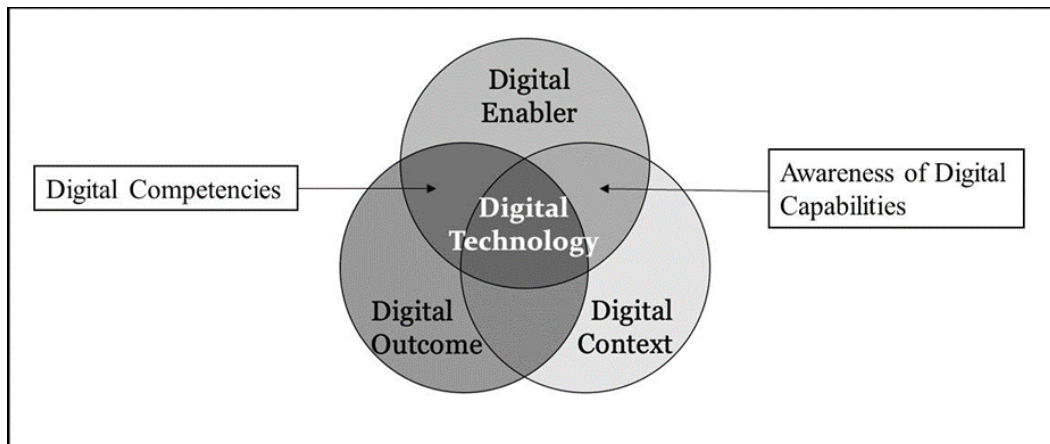


Figure 2: Digital Entrepreneurship Framework adapted from Recker and von Briel (2019)

The digital entrepreneurship framework (Recker and von Briel, 2019) is the theoretical basis to structure the conceptualization of the main components of our research model (see Figure 2). We assigned the *digital competencies* construct in

the intersection of dimensions for digital “outcome” and “enabler” and *awareness of digital capabilities* in the intersection of digital “enabler” and “context”. We describe below how these assignments provide us with the means to interpret and discuss our findings more elaborately in the context of the study and relationships with the dependent variables.

Entrepreneurs have vast opportunities to develop innovative products and services as the “digital outcome” dimension of entrepreneurial processes. For example, these include hardware devices and components such as wearables (e.g., Fitbit), smart devices used in homes, appliances, and automobiles and more sophisticated products like robots and drones (von Briel, Recker et al. 2018). Digital competencies in specific entrepreneurial applications can lead to digital tools and infrastructure (e.g., 3D printers, online database repositories) and emerging offerings such as blockchain, artificial intelligence (AI) and augmented/virtual reality (AR/VR) (Muñoz and Cohen, 2018; Snihur et al., 2018;).

When digital technologies are viewed as “digital enablers”, we begin to fathom how impactful and sometimes disruptive they can be in several aspects of our lives: socio-cultural, economic, political, demographic trends, and regulatory considerations. The impact is more pronounced when the technology which was originally designed for a specific application is later used in other applications in different disciplines and can influence customer satisfaction (Choi, 2019). For example, smartphone apps (application programs) can “enable” the commercialization and distribution of offerings that are not related to phone services (e.g. activity trackers, audio/video content) (Karhu et al., 2018); 3D printers and digital development platforms can enable the effective prototyping and testing of physical artifacts in fields not related to electronics, for example artificial limbs and dental implants in medicine and healthcare (von Briel, Davidsson et al., 2018).

The “digital contexts” dimension is the perspective that is more expansive and touches the broader contexts of entrepreneurship extending into different industries such as healthcare, finance, education, retail, and transportation. Such technologies will in effect establish novel ecosystems for entrepreneurial opportunities (Autio et al., 2018) which may include organizations and external actors in varied sectors and locations (Ferasso et al., 2018). The implications of these ecosystems often manifest as re-engineering of traditional value chains (e.g. supply chain management), unforeseen changes in regulations and governance policies (e.g. blockchain and use of cryptocurrencies like bitcoin), and the emerging industrial competitive landscape as the ecosystems continue to evolve.

In summary, our results indicate that individuals committed to digital entrepreneurship are more likely to be aware of the potential use of technologies as “enablers” and in creating “contexts”. The interaction between the user and the digital artifact will evolve over time and the entrepreneurs will be able to discover new opportunities with the changes in user perspectives, practices, and preferences (Nambisan, 2016). Hence, they will proactively seek creative opportunities and collaborative partnerships across industry sectors in the larger ecosystem.

Managerial Implications for Practice

From the managerial perspective, we believe our work will provide guidance for practitioners, consultants, government agencies, private and educational institutions. Budding entrepreneurs are advised how to channelize and prioritize their time and resources. The entrepreneurial drive may initially manifest as aspirational energy (e.g., ideation) which needs to be transformed into commitment with specific objectives. Our findings indicate that development of digital competencies is not the only basis to prepare for the entrepreneurial journey. In addition, digital entrepreneurs should also invest their time and resources in identification and development of key strategic relationships to position themselves in the initial start-up phase as well as leverage the partnerships for long-term growth and innovation (Beliaeva et al., 2020). These include funding agencies, leaders in the same industry sector, domain-knowledge experts, educational institutions, innovation centers (hubs), NGOs, and business associations.

The interpretation of the results changes our understanding of how new ventures are founded. Individuals with a high degree of awareness of digital capabilities are more likely to have a holistic and collaborative outlook and will attempt to engage all the stakeholders in the entrepreneurial project. It also enhances their strategic orientation to assess and gauge the existing conditions, for example the competitive landscape. They will be better positioned to understand the dynamics of the ecosystem as it unfolds amidst changing conditions and seek appropriate solutions for problems as they emerge. As our results indicate they will pursue educational activities and other avenues to acquire the required digital competencies. This is especially important for today’s educators when designing their curriculum. While offering those traditional entrepreneurship courses, we also need to provide our students materials and opportunities to enhance both their technological know-how and their understanding of the role of digital capabilities.

We suggest that policy makers need to adopt novel approaches that can stimulate the development of digital competencies in the regional entrepreneurial landscape. This can be done in educational and training institutions since research

has shown that entrepreneurship education programs (EEPs) can influence the participants' attitudes towards entrepreneurship (Fayolle and Gailly, 2015). However, promoting the growth of awareness of digital capabilities will be a nuanced proposition which will require the combined actions of policy makers, educators, and business leaders. It is not surprising that scholars have cautioned that before initiating a digital strategy the context and specific circumstances should be carefully considered (Morsch, 2021).

We raise the question whether new types of educational institutions and institutional arrangements are needed in order to facilitate budding entrepreneurs to gain specific insights on digital competencies (Schulman and Rogoff, 2011) and capabilities (Autio et al., 2018). In fact, non-traditional educational institutions (e.g., Coursera, Google Certificates, Microsoft Certificates) have been playing a significant role and have had impact on millions of people worldwide each year. How they are changing today's entrepreneurial efforts and outcomes shall be of interest for researchers, practitioners, and educators. Furthermore, these would depend on the local entrepreneurial ecosystems and available digital competencies in the region. A comprehensive and collaborative plan to provide support through policies and programs from governments, industry, training institutions (Papageorgiou et al. 2022), and society as a whole (Zhao and Collier, 2016) will be required.

LIMITATIONS, FUTURE RESEARCH AND CONCLUSIONS

Limitations and Future Research

While remaining focused on digital entrepreneurial drive in this study, we have not considered other specific outcome drivers (e.g., financial attractiveness or ease of financing for the idea) that can impact the individual's aspiration and commitment. Future studies can consider economic factors as they manifest in this dynamic and competitive landscape. Another valuable approach would be to explore how the awareness of social and public good benefits can act as drivers of entrepreneurial pursuits.

Our approach to this paper is about theory elaboration rather than generation; hence the themes developed in the literature review informed us about the development of the concepts rather than providing items for the variables to be tested. The research design focused on the pre-startup phase of digital entrepreneurship at which time the survey participants are aspiring entrepreneurs. For the data collection methodology, the survey sample represents participants from the state of Florida and is unable to capture the specialties of geographical locations

which may be imperative in the context of digital entrepreneurship. Hence, we generalized the verbiage of the questions on “digital competencies” and “awareness of digital capabilities” to what most participants would be able to relate to while considering digital entrepreneurship.

The findings presented in this study will provide an initial understanding of the impact of the two factors on entrepreneurial drive that can be operationalized in future studies. Digital entrepreneurship involves technological, economic, and social components which contribute to its inherent complexity and thereby would necessitate an in-depth exploration of the phenomenon (Beliaeva et al., 2020). This can be achieved by a qualitative research approach (Yin, 2003) which can include a more detailed analysis of transition from lower levels to higher levels of digitalization through R&D investments and innovative design methodologies. Some examples are a study of organizations eyeing blockchain applications expecting to reap the business value as promised by the technology (Lacity, 2018;). The responses are at a single point in time and thus this study is cross-sectional which is a limitation (Solem, 2015, p. 205). It may not reflect the dynamic nature of the entrepreneurial phenomena that can occur over time.

Our study serves as a foundation for further work in this research stream. We propose the following: (1) Which capabilities of digital technologies need to be considered for entrepreneurial ventures in a given context of the business ecosystem? (2) How can availability of certain digital competencies be leveraged to initiate a start-up project with a certain level of awareness of digital capabilities? (3) How can we extend the analysis beyond the early stages of the venture creation process, which has been the focus of this study?

Conclusion

In this study we have conceptually and empirically advanced research literature in digital entrepreneurship in several ways. First, using the Digital Entrepreneurship Framework (Recker and von Briel, 2019) as the theoretical foundation, we have presented a novel approach that demonstrates the versatility of the framework and unpacks the richness of the dimensions proposed in it. Second, we conceptualize and develop two key factors: digital competencies and awareness of digital capabilities as an integrative approach which can influence digital entrepreneurial drive. Our unique contribution is to direct attention to the awareness of the capabilities of digitalization which is qualitatively different from possession of digital competencies. Third, by proposing a research model that combines the direct and interaction effects of digital competencies and awareness of digital capabilities, we extend the emerging literature in digital entrepreneurship especially

in the pre-startup phase. Fourth, we consider the three dimensions of digital entrepreneurship: digital technologies as enablers, outcomes or contexts of entrepreneurship processes and thereby uncover key sub-themes that can emerge from each of them and their intersections (see Figure 2).

Empirical research serves as a cornerstone in the advancement of knowledge within the entrepreneurship domain, enabling scholars to move beyond theoretical conjecture and examine the intricate realities of entrepreneurial phenomena (Casson, 2018). Our research aligns with the call for rigorous empirical studies that delve into the nexus of digital transformation and entrepreneurship (Achtenhagen et al., 2018). We demonstrated how our study fills the empirical void in this current debate on digital entrepreneurship.

We envision this work will serve as the basis to inform researchers and practitioners by highlighting the characteristics of digital competencies and awareness of digital capabilities as drivers of digital entrepreneurship. In addition to research contributions, our study findings will serve as impetus to inform practitioners and policy makers and provide direction for the development of educational curriculum. We are hopeful that this study will contribute to the exciting and novel research stream in digital entrepreneurship and offer guidance to aspiring digital entrepreneurs.

REFERENCES

- Achtenhagen, L., Brunninge, O., & Melin, L. (2018). Unpacking research on digital technology and entrepreneurship: A review and research agenda. *Technological Forecasting and Social Change*, 127, 1-13.
- Alderete, M., and Gutierrez, L. (2014). Drivers of information and communication technologies adoption in Columbian service firms. *International Journal of Business Information Systems*, 17(4), 373-397.
- Autio, E., Nambisan, S., Thomas, L. D. W. W., & Wright, M. (2018). Digital Affordances, Spatial Affordances, and the Genesis of Entrepreneurial Ecosystems. *Strategic Entrepreneurship Journal*, (12:1), 72–95.
- Bachmann, N., Rose, R., Maul, V., & Hölzle, K. (2024). What makes for future entrepreneurs? The role of digital competencies for entrepreneurial intention. *Journal of Business Research*, 174, 1-18. <https://doi-org.ezproxylocal.library.nova.edu/10.1016/j.jbusres.2023.114481>

- Badenhausen, K. (2016). "Apple, Google Top the World's Most Valuable Brands of 2016," *Forbes*.
(<https://www.forbes.com/sites/kurtbadenhausen/2016/05/11/the-worlds-most-valuablebrands/#44851d8836ec>, accessed March 31, 2017).
- Baum, J. R., & Locke, E. A. (2004). The relationship of entrepreneurial traits, skill, and motivation to subsequent venture growth. *Journal of applied psychology*, 89(4), 587.
- Beliaeva, T., Ferasso, M., Kraus, S., Damke, E. (2020). Dynamics of digital entrepreneurship and the innovation ecosystem: A multilevel perspective. *International Journal of Entrepreneurial Behaviour & Research*, 26(2), 266-284.
- Belitz, C. & Lundstrom, M. (1997). *The power of flow: Practical ways to transform your life with meaningful coincidence*. Harmony Books.
- Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of Marketing Research*, 44(2), 175-184.
- Bird, B. (1988). Implementing entrepreneurial ideas: the case for intention. *Academy of Management Review*, 13(3), 442-53.
- von Briel, F., Davidsson, P., & Recker, J. (2018). Digital Technologies as External Enablers of New Venture Creation in the IT Hardware Sector. *Entrepreneurship Theory and Practice*, (42:1), 47–69.
- von Briel, F., Recker, J., & Davidsson, P. (2018). Not All Digital Venture Ideas Are Created Equal: Implications for Venture Creation Processes. *Journal of Strategic Information Systems*, (27:4), pp. 278–295.
- Brunner, M., Gonzalez-Castañé, G., and Ravesteijn, P. (2021). How Digital Leadership competences and IT Capabilities affect an organization's ability to digitally transform and adopt new technologies. *Journal of International Technology and Information Management*, 30(4), Article 7. DOI: <https://doi.org/10.58729/1941-6679.152>
- Cardon, M.S., Wincent, J., Singh, J. & Drnovsek, M. (2009). "The nature and experience of entrepreneurial passion." *Academy of Management Review*, 34(3): 511-532.

-
- Casson, M. (2018). Entrepreneurship theory: Opportunities and challenges for new directions. *Entrepreneurship Theory and Practice*, 42(4), 568-574.
- Cavich, J., and Chinta, R. (2021). Nascent Entrepreneurs, Entrepreneurial Self-Efficacy, and the Moderators of Race, Gender, and Government Support. *Entrepreneurship Research Journal*, 12(3), 363-389. <https://doi.org/10.1515/erj-2020-0542>.
- CB Insights. (2019). "The Global Unicorn Club," CB Insights. (<https://www.cbinsights.com/research-unicorn-companies>, accessed December 6, 2019).
- Chakravorty, T., Jha, K., Barthwal, S., and Chakraborty, S. (2020). Digital Technologies as antecedents to Process Integration and Dynamic Capabilities in Healthcare: An Empirical Investigation. *Journal of International Technology and Information Management*, 28(4), Article 4. DOI: <https://doi.org/10.58729/1941-6679.1438>
- Chesbrough, H. W. (2010). Business model innovation: opportunities and barriers, *Long range planning*, 43(2-3), 354-363.
- Choi, K. (2019). Technological innovation and product market conditions: R&D rivalry, market competition, and customer satisfaction. *Entrepreneurship Research Journal*, 9(2). <https://doi.org/10.1515/erj-2017-0167>
- Churchill, N.C. & Lewis, V.L. (1983). "The five stages of small business growth". *Harvard Business Review*, 61(3), 1-12.
- Cova, B., & Svanfeldt, C. (1993). Societal innovations and the postmodern aestheticization of everyday life. *International Journal of Research in Marketing*, 10(3), 297-310.
- Craney, T. A., & Surles, J. G. (2002). Model-dependent variance inflation factor cutoff values. *Quality Engineering*, 14(3), 391-403.
- Davidsson, P., Recker, J., & von Briel, F. (2018). External Enablement of New Venture Creation: A Framework. *Academy of Management Perspectives*, 34(3). (<https://doi.org/10.5465/amp.2017.0163>).
- Durbin Watson. (2021). Durbin Watson Test and Test Statistics. Retrieved in June 2021 <https://www.statisticshowto.com/durbin-watson-test-coefficient/>

-
- Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for two-sided markets. *Harvard Business Review*, 84(10), 92.
- Fayolle, A. & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: hysteresis and persistence. *Journal of Small Business Management*, 53(1), 75-93.
- Feng-Jyh, L., & Chihufeng, L. (2021). Key factors affecting technological capabilities in small and medium-sized Enterprises. *International Entrepreneurship and Management Journal*, 17(1), 131-143. <https://doi.org/10.1007/s11365-019-00632-2>
- Ferasso, M., Takahashi, A.R.W. & Gimenez, F.A.P. (2018). Innovation ecosystems: a metasynthesis. *International Journal of Innovation Science*, 10 (4) 495-518.
- Frost, J. (2021). Understanding Interaction Effects in Statistics. <https://statisticsbyjim.com/regression/interaction-effects/>
- George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2021). Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. *Entrepreneurship Theory and Practice*, 45(5), 999–1027. <http://dx.doi.org/10.1177/1042258719899425>.
- González-López, M. J., Pérez-López, M. C., & Rodríguez-Ariza Lázaro. (2021). From potential to early nascent entrepreneurship: the role of entrepreneurial competencies. *International Entrepreneurship and Management Journal*, 17(3), 1387-1417. <https://doi.org/10.1007/s11365-020-00658-x>
- Goss, D. (2005). Schumpeter's legacy? Interaction and emotions in the sociology of entrepreneurship. *Entrepreneurship Theory and Practice*, 29(2), 205-218.
- Henfridsson, O., & Lindgren, R. (2005). Multi-Contextuality in Ubiquitous Computing: Investing the Car Case Through Action Research. *Information and Organization*, (15:2), 95-124.
- Henley, A. (2007). Entrepreneurial aspiration and transition into self-employment: evidence from British longitudinal data. *Entrepreneurship & Regional Development*, 19(3), 253-280.

-
- Karhu, K., Gustafsson, R., & Lyytinen, K. (2018). Exploiting and Defending Open Digital Platforms with Boundary Resources: Android's Five Platform Forks. *Information Systems Research*, (29:2), 479–497.
- Krueger, N., & Brazeal, D. (1994). Entrepreneurial potential and potential entrepreneurs. *Entrepreneurship: Theory and Practice*, 18(3), 91-104
- Lacity, M. (2018). Addressing Key Challenges to Making Enterprise blockchain Applications a Reality. *MIS Quarterly Executive*, 17(3), Article 3.
- Leonardi, P.M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly*, 35(1), 147–167.
- Liu, W., Li, X., & Huang, D. (2011). A survey on context awareness. In 2011 *International Conference on Computer Science and Service System (CSSS)* (June 2011 pp. 144-147). IEEE.
- Lyytinen, K., and Yoo, Y. (2002). Issues and Challenges in Ubiquitous Computing. *Communications of the ACM* (45:12), 63-65.
- Lyytinen, K., Yoo, Y., and Boland, R. J. (2016). Digital Product Innovation within Four Classes of Innovation Networks. *Information Systems Journal* (26:1), pp. 47–75.
- Majchrzak, A., & Markus, M. L. (2013). *Technology affordances and constraints theory* (of MIS). Thousand Oaks, CA: SAGE Publications.
- Manolova, T.S., Carter, N.M., Manev, I.M. and Gyoshev, B.S. (2007). The differential effect of men and women entrepreneurs' human capital and networking on growth expectancies in Bulgaria. *Entrepreneurship Theory and Practice*, 31(3), 407-426.
- March, J. G. (1982). The technology of foolishness. In J. G. March & J. P. Olsen (Eds.), *Ambiguity and choice in organizations*: 69-81. Bergen, Norway: Universitetsforlaget.
- Marvel, M.R. (2011). Human capital and search-based discovery: a study of high-tech entrepreneurship. *Entrepreneurship Theory and Practice*, 37(2), 403-419.

-
- Markman, G.D., Balkin, D.B. and Baron, R.A. (2002). Inventors and new venture formation: the effects of general self-efficacy and regretful thinking. *Entrepreneurship Theory and Practice*, 27(2), 149-65.
- Markovitch, D. G., Huang, D., Peters, L., Phani, B. V., Philip, D., & Tracy, W. (2014). Escalation of commitment in entrepreneurship-minded groups. *International Journal of Entrepreneurial Behavior & Research*, 20(4), 302-323.
- McKelvie A., Haynie, J., Gustavsson, V. (2011). Unpacking the uncertainty construct: Implications for entrepreneurial action. *Journal of Business Venturing*, 26(3), 273-292.
- Mitchelmore, S., & Rowley, J. (2013). Entrepreneurial competencies of women entrepreneurs pursuing business growth. *Journal of Small Business and Enterprise Development*, 20(1), 125-142.
doi:<http://dx.doi.org.ezproxylocal.library.nova.edu/10.1108/14626001311298448>
- Morsch, Paul (2021). "Innovativeness to enlarge digital readiness - How to avoid digital inertia?" *Journal of International Technology and Information Management*, 30(4), Article 8. DOI: <https://doi.org/10.58729/1941-6679.1527>
- Mujtaba, B., Chinta, R. and Seyoum, B. (2020). The Link Between Leadership Styles and Barriers to Entrepreneurship Among Women. *Journal of Academy of Business and Economics*, 20(1): 33-48.
- Muñoz, P., and Cohen, B. (2018). A Compass for Navigating Sharing Economy Business Models. *California Management Review* (61:1), 114–147.
- Nambisan, S. (2016). Digital entrepreneurship: Towards a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*. Advance online publication. doi: 10.1111/etap.12254
- Nambisan, S. (2017). Digital Entrepreneurship: Toward a Digital Technology Perspective of Entrepreneurship. *Entrepreneurship Theory and Practice*, 41(6), 1029-1055.

-
- Nambisan, S., Lyytinen, K., Majchrzak, A., and Song, M. (2017). Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. *MIS Quarterly* (41:1), 223–238.
- Ngoasong, M.Z. (2018). Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competencies. *Journal of Small Business and Enterprise Development*, 25(3), 483-500.
- Neville, F., Forrester, J. K., O'Toole, J., & Riding, A. (2018). Why even bother trying? Examining discouragement among racial-minority entrepreneurs. *The Journal of Management Studies*, 55(3), 424-456.
- Nzembayie, K., & Buckley, A. (2022). Conceptualizing the digital entrepreneurial process. In K. Nzembayie, & A. Buckley (Eds.) *Digital Entrepreneurship: Disruption and New Venture Creation*, Northampton, MA: Edward Elgar Publishing.
- Oberländer, M., Beinicke, A., Bipp, T. (2020). Digital competencies: A review of the literature and applications in the workplace. *Computers & Education*, Volume 146, ISSN 0360-1315, <https://doi.org/10.1016/j.compedu.2019.103752>.
- Papageorgiou, K., and Kokshagina, O. (2022). *Envisioning the Future of Learning for Creativity, Innovation and Entrepreneurship*. Berlin, Boston: De Gruyter, 2022. <https://doi.org/10.1515/9783110752205>
- Pearlson, K.E., Saunders, C.S. & Galletta, D.F. (2019). *Managing and Using Information Systems – A Strategic Approach* (7th ed.). Hoboken, NJ: John Wiley & Sons, Inc.
- PitchBook Data. (2021). Who and what you can research with PitchBook. <https://pitchbook.com/data>
- Puspitasari, I., and Jie, F. (2020). Making the information technology-business alignment works: a framework of IT-based competitive strategy. *International Journal of Business Information Systems*, 34(1), 59-82.
- Recker, J., and von Briel, F. (2019). “The Future of Digital Entrepreneurship Research: Existing and Emerging Opportunities” in *Fortieth International Conference on Information Systems, Munich 2019*.

-
- Reis, D. A., Fleury, A. L., & Carvalho, M. M. (2021). Consolidating core entrepreneurial competences: Toward a meta-competence framework. *International Journal of Entrepreneurial Behavior & Research*, 27(1), 179–204. <http://dx.doi.org/10.1108/IJEER-02-2020-0079>.
- Reuber, A.R. and Fische, A. (2011). International entrepreneurship in internet-enabled markets. *Journal of Business Venturing*, 26(6), 660-679.
- Richter, C., Kraus, S., Brem, A., Durst, S. and Giselbrecht, C. (2017). Digital entrepreneurship: innovative business models for the sharing economy. *Creativity and Innovation Management*, 26(3), 300-310.
- Rockwell, I. (2002). *The Five Wisdom Energies: A Buddhist Way of Understanding Personalities, Emotions, and Relationships*. Shambhala Publications.
- Ross, J. (2014). Do You Have a Great Digital Business Strategy? *Center for Information Systems Research - MIT Sloan School of Management*. (<http://cisr.mit.edu/blog/blogs/2014/09/24/digital-business-strategy/>, accessed May 24, 2018).
- Sahabuddin, R. (2018). Effect of entrepreneurship commitment to self-efficacy through intention of entrepreneurship and competence. *International Journal of Business and Management Science*, 8(1), 67-81.
- Sarasvathy, S., Dew, N., Velamuri, S.R., Venkataraman, S. (2003). “Three views of entrepreneurial opportunity.” In Acs, Z.J., Audretsch, D.B. (Eds.), *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*. Kluwer Academic, Boston, 141–160.
- Schulman, S. A., & Rogoff, E. G. (2011). The technology enabled entrepreneur: Today's hope for a better tomorrow. *Entrepreneurship Research Journal*, 1(4) doi:<https://doi.org/10.2202/2157-5665.1057>
- Schwarz, N., & Clore, G. L. (2007). “Social psychology: a handbook of basic principles.” 2 (pp. 385–407). *New York: Guilford Press. (Feelings and Phenomenal Experiences)*.
- Seo, M. G., Barrett, L. F., & Bartunek, J. M. (2004). The role of affective experience in work motivation. *Academy of Management Review*, 29(3), 423-439.

- Sequoia Capital. (2021). Sequoia 1972 and Beyond. <https://www.sequoiacap.com/people/ethos/>
- Shane, S. and Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *The Academy of Management Review*, 25(1), 217-226.
- Snihur, Y., Thomas, L. D. W., and Burgelman, R. A. (2018). An Ecosystem-Level Process Model of Business Model Disruption: The Disruptor's Gambit. *Journal of Management Studies* (55:7), 1278–1316.
- Solem, R. C. (2015). Limitation of a cross-sectional study. *American Journal of Orthodontics and Dentofacial Orthopedics*, 148(2), 205.
- Teece, D.J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319-1350.
- Tiwana, A., Konsynski, B., and Bush, A. A. (2010). Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. *Information Systems Research* (21:4), 675–687.
- Vidhyalakshmi, R., and Kumar, V. (2016). Determinants of cloud computing adoption by SMEs. *International Journal of Business Information Systems*, 22(3), 375-395.
- Vissa, B. & Bhagavatula, S. (2012). The causes and consequences of churn in entrepreneurs' personal networks. *Strategic Entrepreneurship Journal*, 6(3), 273–289.
- Violetta, W., Cripps, H., Alexandru, C., Micu, A., & Angela-Eliza, M. (2021). The state of #digitalentrepreneurship: a big data Leximancer analysis of social media activity. *International Entrepreneurship and Management Journal*, 17(4), 1899-1916. <https://doi.org/10.1007/s11365-020-00729-z>
- Wales, W.J., Gupta, V.K. and Mousa, F.-T. (2011). Empirical research on entrepreneurial orientation: an assessment and suggestions for future research. *International Small Business Journal*, 31(4), 357-383.
- Wang, C.L. (2008). Entrepreneurial orientation, learning orientation, and firm performance. *Entrepreneurship: Theory and Practice*, 32(4), 635-657.

-
- Wiklund, J. and Shepherd, D. (2005). Entrepreneurial orientation and small business performance: a configurational approach. *Journal of Business Venturing*, 20(1), 71-91.
- Yamini, R., Soloveva, D., and Peng, X. (2022). What Inspires Social Entrepreneurship? The Role of Prosocial Motivation, Intrinsic Motivation, and Gender in Forming Social Entrepreneurial Intention. *Entrepreneurship Research Journal*, 12(2), 71-105. <https://doi.org/10.1515/erj-2019-0129>
- Yin R. (2003). *Case Study Research: Design and Methods (third edition)*. London. Sage Publications.
- Yoo, Y., Henfridsson, O., and Lyytinen, K. (2010). The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research* (21:4), 724–735.
- Yoo, Y. (2010). Computing in Everyday Life: A Call for Research on Experiential Computing. *MIS Quarterly*, 34(2), 213–231. <https://doi-org.ezproxylocal.library.nova.edu/10.2307/20721425>.
- Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2009). Entrepreneurship and dynamic capabilities: a review, model and research agenda. *Journal of Management Studies*, 46(3), 361-387.
- Zhao, F. and Collier, A. (2016). Digital entrepreneurship: research and practice. *9th Annual Conference of the EuroMed Academy of Business*, Warsaw, pp. 2173-2182.
- Zupic, I. (2014). The knowledge base of technology entrepreneurship. In F., Therin (Ed.), *Handbook of research on techno-entrepreneurship*, 2nd ed., (pp. 1–16). Northampton, MA: Edward Elgar.