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AN EMPIRICAL EXAMINATION OF STARTUP SUCCESS: STUDIES ON THE
ANTECEDENTS AND CONSEQUENCES OF STARTUP RELATIONAL EMBEDDEDNESS
AND TECHNOLOGY AMBIDEXTERITY

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AN EMPIRICAL EXAMINATION OF STARTUP SUCCESS: STUDIES ON THE
ANTECEDENTS AND CONSEQUENCES OF STARTUP RELATIONAL EMBEDDEDNESS
AND TECHNOLOGY AMBIDEXTERITY

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AN EMPIRICAL EXAMINATION OF STARTUP SUCCESS: STUDIES ON THE ANTECEDENTS AND CONSEQUENCES OF STARTUP RELATIONAL EMBEDDEDNESS AND TECHNOLOGY AMBIDEXTERITY

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ABSTRACT

Increasingly, entrepreneurial activity is gaining momentum, with almost 10% of the United States population engaged in either starting a business or already owning a startup. Most economic transactions have relational undertones, especially when it concerns startups. This dissertation draws upon relational embeddedness literature and information processing theory to advance a startup governance model highlighting the mediating effect of relational embeddedness on startup success. In addition, this dissertation recognizes technology in the current environment as a critical means to innovate, to introduce novelty, and to grow the business. Consequently, it draws from Information Technology (IT) and dynamic capabilities literature to establish the antecedents of technology ambidexterity and its effects on startup success. Primary survey instruments, from both existing and adapted scales, were used to capture relational embeddedness, technology ambidexterity, their antecedents, and startup success. Partial Least Squares structural equation modeling technique was used to test the structural model. In the first essay (Chapter 2), findings show that informal coordination mechanisms have a positive impact on interorganizational trust, cooperation, and network building, while formal coordination mechanisms have a positive impact on interorganizational network building. Interorganizational cooperation has a positive impact on startup success, and firm size positively moderates the impact of trust on startup success. In the second essay

(Chapter 3), findings show that technology ambidexterity positively impacts startup success. Shared IT vision, IT strategic thinking and IT-enabled market orientation have significant positive impacts on technology ambidexterity, while technology ambidexterity positively mediates between these antecedents and startup success. Therefore, this dissertation has important academic and practical implications for startups, as they strive to achieve success in a hypercompetitive landscape.

Keywords: Startups, startup success, relational embeddedness, technology ambidexterity, Information Technology.

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CHAPTER 1: AN EMPIRICAL EXAMINATION OF STARTUP SUCCESS: STUDIES ON THE ANTECEDENTS AND CONSEQUENCES OF STARTUP RELATIONAL EMBEDDEDNESS AND TECHNOLOGY AMBIDEXTERITY

Entrepreneurship is a multifaceted phenomenon that runs across many disciplinary boundaries (Low & MacMillan, 1988). This two-part exposition focuses on two of them—startup governance mechanisms and startup technology ambidexterity. Entrepreneurship has a pivotal function in the economy. The Global Entrepreneurship Monitor, which has been evaluating the state of entrepreneurship across the globe since 1999, maintains entrepreneurship plays a significant role in sustainable economic development in many economies (Bosma, 2013). In the United States, 64% of new jobs created in the decade ending 2012 were from small businesses, as reported by the Small Business Administration (Hakobyan, 2016).

Entrepreneurships and, by extension, startups are at the forefront of establishing novelty in product and service offerings and are key to economic growth (Schumpeter, 1934). At any given time, about 10% of the U.S. population is engaged in starting a business or has already done so. Even though 50% of startups fail in the first year and 95% fail within the first five years for strategic and interorganizational relationship reasons (Mason, 2017), interest in startups goes on unabated. Startups are often faced with unique dual-challenges: to discover new prospects for future growth and to exploit existing opportunities to maintain the present business model (Foreby, Tammisto & Aberg, 2016). These existential challenges necessitate access to key market-oriented information and mission-critical resources, which means that startups need to adopt effective interorganizational relationships with partners, for e.g., customers, technology providers, and suppliers (Liao & Welsch, 2005). As the reliance on partners flourishes, managing such relationships with partners becomes an important consideration for startups' survival and growth.

Scholars have acknowledged the role of governance and relational embeddedness in startups. Nevertheless, the extant literature requires more work to build towards a deeper, more nuanced perspective on the nature of interorganizational governance mechanisms and embeddedness factors and their impacts on the success or failure of startups. Additionally, following Schumpeter (1934), entrepreneurial firms constantly introduce novelty in the marketplace with new approaches and techniques. March (1990) advanced the notion that firms need to concentrate on both exploiting current certainties and new possibilities. In this regard, technology plays a crucial function in exploitation and exploration. Organizationally, Tushman and O'Reilly (1996) termed this ambidexterity. Though organizational ambidexterity and process ambidexterity have been the focus of scholars heretofore, their attention almost exclusively has concentrated on structural or contextual aspects (Bot, 2012; Fernhaber & Patel, 2012; Lubatkin, Simsek, Ling & Viega, 2006; Tushman & O'Reilly, 1996).

In other terms, the literature has exclusively advanced an organizational view to balance exploration and exploitation. Rothaermel and Alexandre (2009), employing an ambidexterity stance to a firm's technology sourcing strategy, found balancing external and internal sourcing of technology enhances firm performance. According to Bot (2012), concentrating on "issues of balancing mainstream exploitation and new stream exploration" in medium to large scale entrepreneurial firms and extending to startups (p 21.) supported a process perspective. Nonetheless, the missing link seems to be one of tracing the antecedents of technology ambidexterity. Prior research thus has limited itself to non-technology matters, leaving the role of technology in ambidexterity understudied.

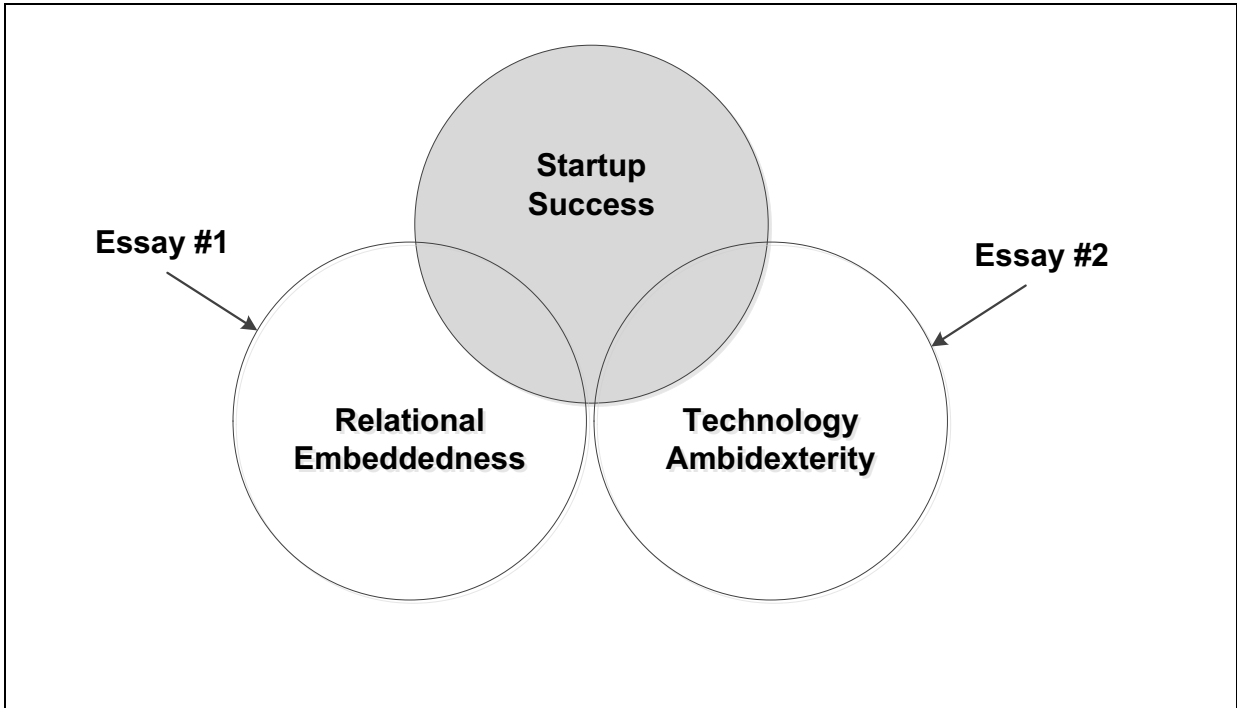


Figure 1.1 An empirical examination of startup success: Two essays

Figure 1 depicts the two essays of this dissertation with their respective themes: relational embeddedness and technology ambidexterity. Accordingly, Essay 1 focuses on relational embeddedness (trust, cooperation, and network building) while Essay 2 focuses on technology ambidexterity.

Startup Success

Startups by design pursue a growth strategy (Ireland, 2017) and in so doing are faced with the dual challenge of exploiting existing strengths and exploring new opportunities. Two important ingredients for startup success are relational embeddedness and technology. Startups are resource challenged and in keeping with the notion that all economic activity is embedded in relationships (Granovetter, 1985 a), startups rely on their networks for survival and growth, which in turn depends on access to key market-oriented information and resources (Gomez, 2007). Startup entrepreneurs greatly benefit from network relationships in terms of information, resources, and guidance, which positively affect exploitation and exploration activities and startup performance. Due to the high probability of startup failure (Mason, 2017), it is imperative that interorganizational relationships are managed appropriately (Liao & Welsch, 2005).

Prior research has focused on dual themes with regard to startups: a startup's relationship with partners and its impacts and the governance mechanisms used. The inferences drawn point to integration of information and resources from external partners being beneficial to startup performance (Maurer & Ebers, 2006). Likewise, empirical studies have shown the positive effect of social capital on startup performance with an emphasis particularly on social capital—strong or weak ties (Pirolo & Presutti, 2010). Yet another stream of scholarly work has been directed at governance and associated mechanisms that are useful in managing interorganizational challenges on the one hand and, on the other, are predictors of startup success

(Eisingerich, et al., 2009). As relationships may be subject to frictions, interorganizational governance mechanisms may be conducive to proper interorganizational relationship and may be resistance reducers (Sedlacek & Sterk, 2014). Thus, intra- and intergroup exchanges involve a deep relational footprint (Nahapiet & Ghoshal, 1998).

Relational Embeddedness

The benefits of interorganizational relationship are manifold, including access to market-oriented information, resources, and guidance. For exchanges to be meaningful, they have to be coordinated and integrated, engendering collaboration and cooperation and positively influencing firm performance (Milana & Maldaon, 2015). Increased interaction amongst interorganizational members smooths the path towards establishing trust. Prior research has presented a picture of acceptance of the role of governance and relational embeddedness in general when it comes to startups. Despite this acknowledgement, what is lacking is clarity and an in-depth view of the nature of interorganizational governance mechanisms and their concomitant influences on startup success or failures. From a real-world assessment, this presents multiple tracks that may be pursued. For example, a detailed scrutiny into the types of governance mechanisms utilized by startups, an unpacking of the relational embeddedness construct—interorganizational trust, interorganizational cooperation, and network building—and their impact on startup success or failure would be meaningful and substantive. Thus, prior research, while it has recognized the role of governance and relational embeddedness in general in startups, has fallen short and is deficient in forming a nuanced view of the interorganizational governance mechanisms and embeddedness landscape. Additionally, the extant literature has been found wanting in articulating the impacts of governance mechanisms on interorganizational trust, cooperation, network building, and ultimately firm performance.

Technology Ambidexterity

March (1991), in the seminal paper on exploration and exploitation in organizational learning, argued for a balance between the exploitation of old inevitabilities and the exploration of new potentials as a leading factor in endurance and success. Tushman and O'Reilly (1996) introduced the concept of organizational ambidexterity to describe the ability to concurrently follow both incremental and sporadic change. Ambidexterity, the facility to synchronously exploit existing proficiencies and explore new opportunities, has been a persistent concept in organizational studies (O'Reilly & Tushman, 2013; Raisch et al., 2009). While, scholars have refined ambidexterity and its various impacts, it has been structurally focused, and process driven. Ambidexterity has as yet to be viewed through a technology lens.

One of the approaches to ambidexterity is through technology. While prior research has dealt extensively with firm challenges of balancing exploitation of current competencies and exploration of new opportunities—organizational ambidexterity—it has stopped short of elucidating on one of the most essential means of achieving ambidexterity, namely technology. Despite a vast inventory of scholarly work on ambidexterity, there is a significant unknown space in the meaning and application of technology ambidexterity, its unpacked components, and the impact on firm performance.

Technology plays a crucial role in balancing mainstream exploitation and new stream exploration in medium to large scale entrepreneurial firms and the thought process can be extended to startups as well. The ubiquity of technology is by now well established as the *2016 Global Information Technology Report* recognized the rapidity of technology driven economic development across all industries. An interesting main set of effects of this rapid change related to management, governance, and myriad other areas (Baller et al., 2016).

Research Questions

Building on prior scholarship, this research extends the theory of relational embeddedness and the theory of ambidexterity. First, this research unpacked relational embeddedness (trust, cooperation, and network building) and examined the antecedents to relational embeddedness (informal and formal coordination). Second, it empirically studied the mediating impact of relational embeddedness on startup success moderated by firm size. Third, it scrutinized the effect of technological ambidexterity on startup success. Fourth, this research examined the antecedents to technology ambidexterity bifurcating the antecedents into organizational and technology factors. Figure 1 depicts the proposed research of these themes. Thus, Essay 1 focuses on relational embeddedness while Essay 2 emphasizes technology ambidexterity.

The main purpose of this research was to increase our understanding of the drivers of startup success and how success is impacted by relational embeddedness (Essay 1) and technology ambidexterity (Essay 2). The following are the research questions pursued by this dissertation:

1. What are the impacts of relational embeddedness factors (trust, cooperation, and network building) on startup success?
2. What are the effects of startup formal and informal governance mechanisms on relational embeddedness factors (trust, cooperation, and network building)?
3. What are the impacts of technology ambidexterity on startup success?
4. What are the impacts of the Information Technology (IT) oriented antecedents on technology ambidexterity?

To summarize, despite scholars' focus on social capital in general and relational embeddedness in particular as key determinants of startup interorganizational governance, an in-

depth look into the mechanisms of the antecedents of relational embeddedness deserves attention. While several scholarly attempts at describing embeddedness have been made, prior research has focused mostly on relational embeddedness from a structural or quality of the relationship perspective. Interorganizational relationships are solidified over a period and require nurturing. Further, viewing startups through a technology lens, I contend that technology ambidexterity is an important dimension that deserves careful consideration for the following reasons.

In filling the gaps mentioned previously in the extant literature, this dissertation makes several theoretical and managerial contributions. First, our understanding of the driving forces behind startup success is enhanced. Second, attention to relational embeddedness and its three dimensions (trust, cooperation, and network building) from an interorganizational perspective is drawn. Third, from a practitioner's perspective, managers can now determine the success or failure of a startup in terms of whether their organization is technologically sophisticated. These three contributions combine to deliver a greater understanding of startup success and its antecedents.

CHAPTER 2: WHY DO INTERORGANIZATIONAL RELATIONSHIPS MATTER FOR STARTUPS? THE IMPACTS OF INTERORGANIZATIONAL GOVERNANCE AND RELATIONAL EMBEDDEDNESS ON STARTUP SUCCESS

ABSTRACT

Entrepreneurship has acquired a unique status as an instrument of economic and social advancement. At any given time, around 10% of the U.S. population is actively considering starting a new business. However, despite decades of scholarly work, the literature has yet to shine the light on an entrepreneurial governance model with focus on startups. Drawing upon information processing theory and relational embeddedness literature, I propose an entrepreneurial governance model exhibiting the mediating effect of relational embeddedness (interorganizational trust, interorganizational cooperation, and network building) on startup success, with coordination mechanisms acting as antecedents of relational embeddedness. I also posit that firm size moderates the relationship between relational embeddedness and startup success. Findings from a positivist survey of 220 startups showed that informal coordination mechanisms have a positive impact on interorganizational trust, cooperation, and network building, while formal mechanisms have a positive impact on network building. Interorganizational cooperation significantly predicted startup success, while the impact of trust on startup success was positively moderated by firm size. This study has important implications for researchers as it proposes an interorganizational governance model for startups, explicates the antecedents of relational embeddedness, and empirically demonstrates the impact of relational embeddedness on startup success.

Keywords: Startup, interorganizational governance mechanisms, relational embeddedness, interorganizational trust, interorganizational cooperation, network building, entrepreneurship, startup success

Chapter 2: Why Do Interorganizational Relationships Matter for Startups? The Impacts of Interorganizational Governance and Relational Embeddedness on Startup Success

Increasingly, as innovation is recognized as the pathway to sustainable competitive advantage among firms, the significance of entrepreneurship and especially startups has been well-acknowledged in many industries. Entrepreneurships, and by extension startups, have acquired a unique status as instruments of economic and social advancement, sustainable job creation, and competitiveness (Audretsch, 2009). According to the Global Entrepreneurship Monitor (GEM), nearly 10% of the U.S. population is actively looking at starting a new business at any given time, with about 27 million individuals starting a new business or startup in 2015. This increased startup activity notwithstanding, research on startups has stated that 50% of startups fail in the first year and 95% fail within the first five years due to a variety of factors including strategic and interorganizational relationship factors (Mason, 2017).

Startups are firms designed to pursue a growth strategy, to achieve higher year-over-year sales, and to attain rapid growth (Ireland, 2017). They are often faced with distinctive dual-challenges: to explore new opportunities for future growth and to exploit existing opportunities to sustain the present business model (Foreby, Tammisto, & Aberg, 2016). Such survival challenges require access to key market-oriented information and mission-critical resources, which means that startups need to foster effective interorganizational relationships with partners (e.g., customers, technology providers, and suppliers; Liao & Welsch, 2005). As the dependence on partners grows, managing such relationships with partners becomes an important consideration for startups' survival and growth.

In this regard, prior research has shown two distinct streams of interorganizational literature related to startups: a startup's relationship with partners and its impacts and the

mechanisms used by startups to govern their partners. For instance, in their study of biotechnology startups, Maurer and Ebers (2006) concluded that integration of information and resources from external partners is conducive to startup firm performance. Similarly, Pirolo and Presutti (2010) empirically demonstrated the impact of startup social capital and startup performance; they empirically established the connection between particular social capital configurations (strong and weak ties) and startup performance. The second stream of literature has pointed to robust governance and allied mechanisms that open the way for startups to manage interorganizational challenges and are significant predictors of startup success (Eisingerich, Rubera, & Seifert, 2009). Notably, interorganizational governance mechanisms can establish effective relationships that may avoid friction between the partners (Sedlacek & Sterk, 2014).

Interorganizational and personal relations insinuate relational embeddedness which embodies deep personal relations conveying a sense of respect, trust, and friendship (Nahapiet & Ghoshal 1998). Relational embeddedness also is reflection of the impacts of the content of direct, dyadic relations (Barden & Mitchell, 2007) and echoes the quality of the relationships (Moran, 2005). One consequence of relational embeddedness is common relationship-specific exchanges that streamline communication (Ozemir, et al, 2014). Relationship specific exchanges occur in the context of interorganizational activities which require coordination and often useful governance mechanisms (Dekker, 2004).

Prior research has thus acknowledged the role of governance and relational embeddedness in general in startups. However, it distinctly has lacked a deeper, more nuanced perspective on the nature of interorganizational governance mechanisms and embeddedness factors and their impacts on the success or failure of startups. For instance, do governance mechanisms have any impact on improving trust, network building, and so forth? How does

interorganizational trust impact success or failure of startups? What is the impact of relational embeddedness (trust, cooperation, and network) on startup success? These important research questions still remain unanswered in prior literature.

To address this research gap, I drew upon two theoretical perspectives, information processing theory and relational embeddedness literature, to build a research model of predictors of startup success. I theorized on the impacts of relational embeddedness (trust, cooperation, and network building) on startup success and postulated that formal and informal coordination mechanisms are antecedents of relational embeddedness. I also theorized on the moderating role of firm size on the relationship between relational embeddedness and startup success. To empirically test the research model, I proposed to conduct a survey of startups across the United States, data for which was planned to be acquired through the United States Association for Small Business and Entrepreneurship (USASBE).

The overall research questions this study sought to address are:

1. What are the impacts of relational embeddedness factors (trust, cooperation, and network building) on startup success?
2. What are the effects of startup formal and informal governance mechanisms on relational embeddedness factors (trust, cooperation, and network building) and startup success?

The rest of the paper is organized as follows: the selected literature on relational embeddedness, formal and informal governance mechanisms is reviewed. Utilizing the literature as a platform, I then theorize the impact of formal and informal coordination mechanisms on relational embeddedness followed by an analysis of the moderating effect of organizational learning on innovation success. I follow this up with an explanation of the methodology used to test my hypotheses. I then conclude with an acknowledgment of the limitations of the study, a

discussion of the conceptual and empirical contributions of the study, and implications for future research.

Literature Review

A considerable body of literature exists that elucidates the significance of relational embeddedness in economic transactions. Additionally, scholars have also explicated the role of coordination, trust, cooperation, and networks in interorganizational relations. New business startups proliferate in the United States in substantial numbers, yet the survival rate is woefully low (Reynolds, 2001). The ingredients for startup success are many and varied, but two of them are personal contacts and network of people (Low and MacMillan, 1988). That startup success is dependent on relationships and a network of people suggests the need for governance mechanisms driven by the challenge of acquiring access to market information and mission critical resources (Liao & Welsch, 2005). Therefore, relational embeddedness and coordination mechanisms become important considerations in startups. I review the extant literature on these two aspects in the following paragraphs.

Relational Embeddedness

Several theories give weight to the examination of a viable entrepreneurial governance model. I focused on two of them in this study—relational embeddedness and information processing. Embeddedness captures the historical exchanges and discussions within a group, routinizing and stabilizing linkages among members of the group (Marsden, 1981). In the seminal work on embeddedness, Granovetter (1985) asserted that organizational behavior is constrained by ongoing social relations. In introducing social capital, Coleman (1988) expounded on the term by drawing parallels with financial capital, physical capital, and human capital, with one difference: social capital is embodied in human relations. Social capital captures the essence of relational resources embedded in personal ties and emphasizes the

benefits in terms of information flow and influence (Sandefur & Laumann, 1988). Intra- and inter-group exchanges entail a deep relational imprint, implying that networks of personal relationships establish a valuable resource that can be termed as collectivity owned capital (Nahapiet & Ghoshal, 1998). Social capital is broadly used in extant literature to include a wider array of collective phenomena such as intra- and inter-firm relations (Tsai & Ghoshal, 1998). Inhered in relational embeddedness are personal relationships developed across many transactions over a period that exudes respect and friendship, affecting behavior towards the other (Nahapiet & Ghoshal 1998). As interactions increase, the need for coordination mechanisms becomes more imperative.

Startup entrepreneurial firms and their economic behavior are fueled by ongoing social personal relationships within concrete personal networks engendering trust, thus embedding in relations internal to a social group (Granovetter, 1985). Further, trust is a shared experience which makes cooperation among organizations easier (Sydow, 1998). Trust between organizations is advanced over time as a result of interactions due to shared values, similar behavior and common understandings and is central to all transactions (Dasgupta, 2000), thus it extends the notion about trust put forth by Pratti and Pratti (2014) within entrepreneurship to interorganizational trust. Startups face uncertainty in the marketplace (von Gelderen, Frese, & Thurik, 2000) and since interorganizational trust reflects a low propensity for unpredictable behavior amongst partners (Bachmann & Zaheer, 2006) because of coordination, interorganizational trust is an important contributor to performance (Krishnan, Martin & Noorderhaven, 2006).

Economic action is constrained and fashioned by the configuration of social relationships in which all economic actors are embedded (Granovetter, 1992). Startups as entrepreneurs are value creators, with value creation coming from entrepreneurial firms' facility to cultivate

intense relationships (Nahapiet & Ghoshal, 1997). Because start-up firms play an important role in the global economy, it behooves us to examine the social context (Jones, Hesterly, & Borgatti, 1997) in terms of the network of relationships within and outside the industry. Networks are built around the startup's efforts to "exploit prospects integral in the network" (Walker, Kogut, and Shan, 1997, p 110). The relational outlook gives rise to the notion of social capital and its application to an expansive array of social phenomena (Tsai & Ghoshal, 1998). The embeddedness angle embodied within an overall sociological understanding informs the economic comportment of entrepreneurs (Thornton, 1999) and points to alertness to new opportunities as a foundational entrepreneurial characteristic (Koppl & Minniti, 2003), with the alertness being nurtured through relational contacts.

However, the quality of the relationship is incredibly important as Moran (2005) explicated in saying that the quality of relationship (relational embeddedness) is as important as how the relationship is configured (structural embeddedness). The significance of network relationships on spurring and advancing novelty cannot be overstated (De Carolis & Saporito, 2006). Startup firms are entrepreneurial entities bound in formal and informal ways, and as such, their successes or failures lie within their embedded relational milieu (Granovetter, 2010). It follows then that startup output or success is fundamentally associated with the firm's relational context (Autio, Kenney, Mustar, Siegel, & Wright, 2014). This connotation underlines the usefulness of networks of relationships as a resource delivering a collectivity—owned capital (Nahapiet & Ghoshal, 1998). Essentially, relationships expand the quality and substance of interaction within and outside the firm generating collaboration and cooperation, hence positively affecting performance (Milana & Maldaon, 2015).

Consequences of Relational Embeddedness

Following the idea from Granovetter (1985) that all economic activity has a relational undertone,

it can be emphasized that startups rely on their networks of relations to get access to critical resources (Liao & Welsch, 2005). Sustainable competitive advantage is built on relational embeddedness and is not easily replicable (Yli-Renko, et al., 2001). Given that social relations are a personification of goodwill manifested in trust (Adler & Kwon, 2002) and extending the notion of relational embeddedness to interorganizational relations, an important facet of relational embeddedness is that repeated transactions facilitate trust in interorganizational partners, with trust being an important contributor to startup performance (Gulati, 1995). Subsumed in relational embeddedness is the quality of relations which has a bearing on economic performance (Moran, 2005).

In addition, a network of relations guides the quality and movement of information and is used as a means to channel incentives and generate trust (Granovetter, 2005). Trust is an obligatory element of relational embeddedness reinforced by social interaction (Moran, 2005). Uzzi (1997) empirically concluded that there exists in relational embeddedness a unique logic of economic exchange based on trust that results in long-term cooperative bonds rather than narrowly pursued self-interest.

Considering that startups control few resources, reliance on social relationships becomes a crucial and principal source of all kinds of resources (Ozdemir, et al., 2014). A startup network of relations expands the reach of startups in terms of substance of interorganizational interaction, facilitating collaboration and cooperation. In summary, relational embeddedness positively influences startup success (Pirolo & Presutti, 2010).

Antecedents of Relational Embeddedness

In this study, relational embeddedness is modeled as consisting of three aspects: interorganizational trust, interorganizational cooperation, and network building (Maurer & Ebers,

2006). Further, I posited informal and formal coordination mechanisms are the two antecedents of relational embeddedness. Coordination—the management of dependencies between activities (Malone & Crowston, 1994)—in interorganizational relations is critical for organizational performance (Gittell, 2002). Viewed through the information processing theory lens, organizations are constantly exposed to uncertainty, necessitating a high level of information processing in the pursuit of organizational performance (Galbraith, 1974), and must set up coordination mechanisms (Tushman & Nadler, 1978). Further, coordination mechanisms are founded on information flow, thus influencing concerned organizations and individuals (Adler & Kwon, 2002).

Relational embeddedness literature is replete with scholarly work on the role of social relations (relational and structural) on firm performance, starting from all economic exchanges being embedded in social relations (Granovetter, 1985; Moran 2005). Startups are faced with a lot of uncertainty in the marketplace. Galbraith (1973) suggested uncertainty increases the amount of information that is required to be processed and that coordination mechanisms could play a vital role in the development of relational embeddedness. Some startups may encounter challenges coordinating information to and from other organizations (e.g., customer groups, suppliers, rivals, etc.); however, interorganizational coordination mechanisms institute noticeable and far-reaching relationships in avoiding such resistance (Sedlacek & Sterk, 2014).

Formal and informal coordination mechanisms have a positive effect on the elements of relational embeddedness—interorganizational trust, interorganizational cooperation, and interorganizational network building (Gulati et al., 2012; Nahapiet & Ghoshal, 1998). Coordination mechanisms advance openness and transparency and result in establishing a high degree of interorganizational comfort. Following Gulati (1995), through repeated interactions either via formal or informal coordination mechanisms, firms in the interorganizational network

learn about each other and develop trust through close personal relationships. This is in line with the notion that repeated encounters lead to the development of bonds between people (Dasgupta, 2000).

Work done in most organizations necessitates a level of communication and cooperation that makes coordination imperative (Kraut et al., 1990). When looked at from an interorganizational perspective, coordination is crucial. Since the typical startup is dependent on various partner organizations, coordination becomes a key requirement (Galbraith, 1994). The flow of market-oriented information and the access to resources from several and varied sources would require an effective set of coordination mechanisms to coordinate and integrate (Maurer & Ebers, 2006). Startups seek collaboration from partners making coordination integral to bringing partners together (Gulati, et al., 2012). Formal and informal coordination mechanisms contribute to more effective decision making (Balaji & Brown, 2014).

According to Gulati (1995), an important consequence of frequent inter-firm interaction is inter-firm cooperation. Interorganizational cooperation is increasingly central to firm success, as evidenced by the positive relationship between interorganizational cooperation and firm success (Smith et al., 1995). Interorganizational cooperation by definition extends the notion of collaboration to a large set of activities which are focal to the relationship and, from an information processing standpoint, reduce uncertainty (Bensaou 1997; Galbraith, 1973). Interorganizational cooperation is a consequence of resource dependence amongst firms (Gulati, 1998) and is prompted by the notion that resources are scarce and that no firm has all the resources needed to realize its purposes in the marketplace (Gebrekidan & Awuah, 2002).

Networks have a unique and cyclical effect on interorganizational cooperation as the initial wave of cooperation frees up resources to establish new relationships which in turn

strengthen existing ones (Walker, Kogut, & Shan, 1997). According to Gulati and Gargiulo (1999), network formation within organizations develops over a period based on embedded relationships and becomes a storehouse of information about partners, and importantly, the more the network absorbs information the more they resort to the network.

Summary of Literature Review

To summarize, all economic activity is embedded in social relations. Startups propelled by a desire to grow are dependent on relationships within their social networks to gain access to resources. Interorganizational relationships engender trust as a consequence of which interorganizational cooperation is enhanced. Consequently, the importance of managing and governing interorganizational relationships cannot be emphasized enough. Relational embeddedness is influenced by its antecedents—formal and informal coordination mechanisms. Formal and informal coordination mechanisms lead to increased levels of trust and interorganizational cooperation. The upshot of a successful network of relations is that it becomes a platform for further network expansion. Relational embeddedness positively impacts startup performance and, by extension, startup success.

Thus, from the perspective of startups, prior research appears fragmented and lacking an integrated and nuanced view of the nature of relational embeddedness, its antecedents, and their influence on relational embeddedness. For example, questions that are still unanswered include: Do governance mechanisms have any impact on improving trust, network building, and so forth? How does interorganizational trust impact the success or failure of startups?

Research Model and Hypotheses Development

Figure 2.1 below depicts the research model and hypotheses development. Formal and informal coordination mechanisms were hypothesized to impact startup relational embeddedness.

Relational embeddedness was posited to positively impact startup success moderated by firm size. The model depicts startup relational embeddedness mediating the effect of formal and informal coordination mechanisms on startup success.

Impacts of Relational Embeddedness on Startup Success

Relational embeddedness is defined as the interdependence between social relations, exchange of resources, and combination of resources in the relationships (Andersson et al. 2005). Innovative outcomes are contingent upon relational dealings between contacts and the dynamics of give and take exemplifying reciprocal knowledge sharing, all of which are intangible (Moran, 2005). Relational embeddedness (trust, cooperation, and network) provides a firm the means to seek diverse sources of information and knowledge conducive to innovative outcomes (Maurer & Ebers, 2006). It facilitates common understandings and emphases, enabling knowledge generation and interchange which in turn have a direct impact on the firm's ability to innovate (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004). In this study, relational embeddedness was modeled as consisting of three aspects: interorganizational trust, interorganizational cooperation, and network building (Maurer and Ebers, 2006). Each of these aspects is discussed in detail in the follow paragraphs.

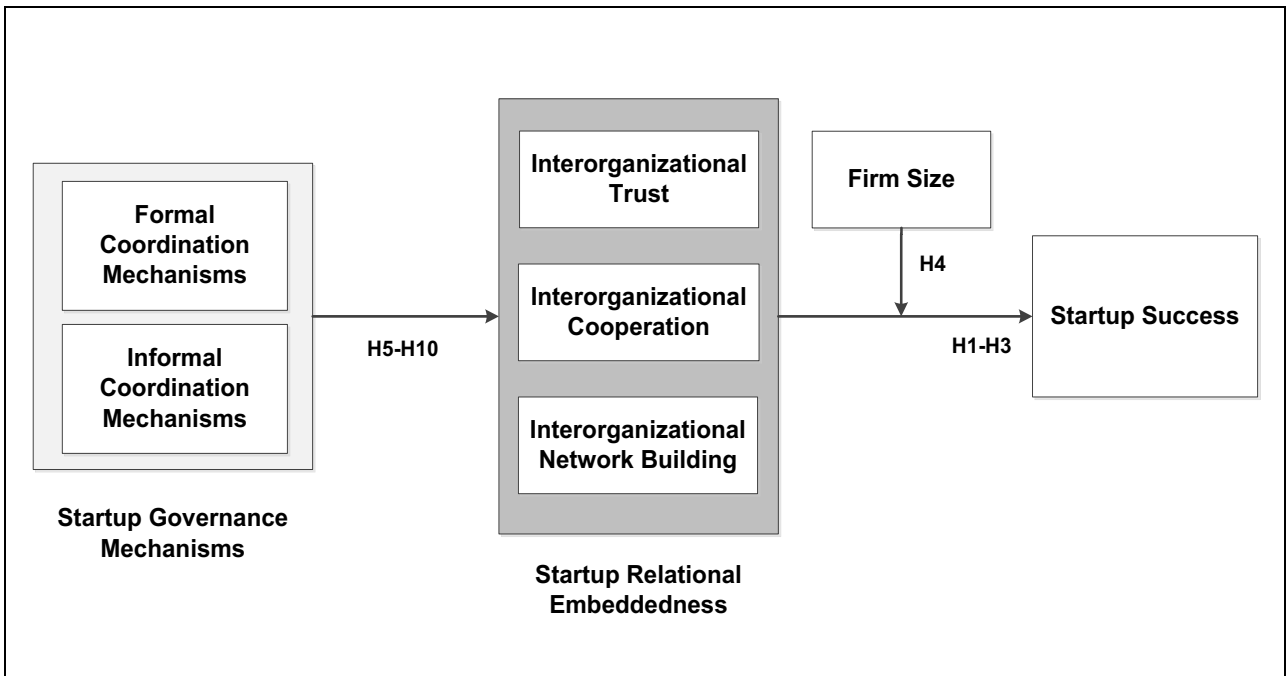


Figure 2.1. Research model and hypotheses

Interorganizational trust. Interorganizational trust is defined as an “expectation that alleviates the fear that one’s exchange partner will act opportunistically” (Gulati, 1995, p. 91). Prior research has found that interorganizational trust is a significant predictor of firm performance. For example, Zaheer, McEvily, and Perrone (1998) found a high level of interorganizational trust yielded competitive advantage and directly and positively affected firm performance. Gulati and Nickerson (2008) studied the automobile industry and substantiated the direct and positive influence of trust on performance.

Interorganizational trust between the startup and its partners can significantly impact the success of the startup. Interorganizational trust can act as a lubricant of the relationship, facilitating a smooth relationship between partners (Arrow, 1974; Dasgupta. 2000). Increased trust between startups and its partners can provide distinctive benefits to the startup. It can enable a free-flowing platform for effective communication and sharing of ideas between partners without barriers (Misztal, 1996; Nahapiet & Ghoshal, 1988). As startups begin to generate ideas, they gain effective information about their ideas from partners who share real-world feedback about the ideas and predict the future market potential (Gulati, 1999; Krishnan, Martin, & Noorderhaven, 2006), thereby increasing relational rents (Dyer & Singh 1998). This is an essential step for weeding out unwanted ideas and focusing quickly on the ones that will succeed. For example, quick prototyping, focus groups, and so forth can give credibility to the startup. Therefore, as the trust between startups and partners increases, the relational rent can accrue for the startup. Hence, I postulated:

H₁: Interorganizational trust will have a positive impact on startup success.

Interorganizational cooperation. Interorganizational cooperation is defined as mutually engineered means for joint actions which are repeatedly molded by actions and

representational elucidations by the parties involved (Ring & Van de Ven, 1994).

Interorganizational cooperation is so vital that performance differences between firms can be attributed to interorganizational cooperation (Smith, Carroll, & Ashford, 1995). According to Smith, Carroll, and Ashford (1995, p. 10), cooperation can be one of two types—informal and formal cooperation—and to the extent that informal cooperation is based on “behavioral norms rather than contractual obligations”, it induces malleable activities to occur and energize cooperation.

Interorganizational cooperation can have a significant impact on the success of startups. Access to critical resources can lead to relational rents through the combination of resources, reduction of communication errors, and enhancement of speed to market (Baum et al. 2000; Dyer & Singh, 1998). For instance, Gans et al. (2001) advocated interorganizational cooperation for startups as the relative returns to cooperation increase intellectual property rights and lower transactions costs and the cost of the sunk assets associated with product market entry. Shan et al. (1994) demonstrated the influence of interorganizational cooperation on startup success in the biotechnology industry. Wu (2007) substantiated this in a study of high-tech startups in Taiwan; the study showed that external resources and interorganizational cooperation positively impact startup performance mediated by the startup’s ability to integrate external and internal resources. Therefore, I postulated that interorganizational cooperation can lead to superior outcomes for the startup:

H₂: Interorganizational cooperation has a positive impact on startup success.

Interorganizational network building. Zimmer (1986) defined a network as the totality of all persons or organizations connected through a relationship and is constructed by finding the relationship between all persons or organizations regardless of how the network is organized. A

social network can be described as a set of persons or organizations connected by a set of well-defined social interactions, such as friendships or common interests (Gulati, 1998). In short, networks are a distinct set of individuals or organizations connected by a set of linkages (Hoang & Antoncic, 2003).

Startup participation in networks can have a significant impact on startup success. This is particularly pertinent to startups as they are set up based on personal relationships (Kilby, 1971). Networks embody personal relationships that have been developed over time and withstood transactional challenges such that the ensuing friendship and respect have behavioral influence (Nahapiet & Ghoshal, 1998). For instance, in a study of Canadian biotechnology startups, Baum, Calabrese, and Silverman (2000) empirically showed that startups could enhance their performance by creating partnerships and organizing them into efficient networks. Network building is a crucial means for startups to get access to information and other resources they may acquire through their contacts within a social network (Greve & Salaff, 2003). A considerable number of startups collapse each year due to lack of resources (Brush et al., 2001). According to Brush et al. (2001), building a resource base is a multifaceted undertaking and requires careful consideration. Resources such as human and financial capital are critical to startup success. One way to augment these critical resources is through networks. Hence, I postulated that:

H₃: Startup participation in networks will positively impact startup success.

Moderating Role of Firm Size

Firm size may be defined in terms of sales volume, number of employees, or market share. In the present study, I approached size as number of employees. The rationale was that size gives the ability to compete via economies of scale, making returns higher for larger firms (Knott & Vieregger, 2015). Startup success may be higher because of size. The impact of

relational embeddedness on success is a function of how many resources the startup can devote to monetizing innovation.

Startup size moderates the effect of relational embeddedness on startup success as larger size enables the firm to establish greater number of contacts and therefore expand the startup's connectedness. As startups grow, they either possess more resources or can acquire them, making the startup more sensitive to opportunities (Park et al., 2002). Thus, the utility of their relational embeddedness increases with size. Almeida et al. (2003) suggested as startups increase in size, they are presented with increasing opportunities to learn from external sources. This is principally because they have the bandwidth to initiate and make contact with an expanded network of external people and organizations.

I posited that firm size will positively moderate the relationship between relational embeddedness and startup success, such that larger firms will experience a higher impact of relational embeddedness on startup success compared to smaller firms. Startups are resource challenged in terms of time and physical, human, and financial resources. However, larger firms may have the resources and therefore the flexibility to channel resources appropriately. Larger startups have better ability to manage the relationship process of building trust, increasing cooperation, and ultimately expanding their networks. For example, because trust is formed over time and is engendered through interpersonal experiences (Moran, 2005), larger startups may have a resource advantage over smaller ones because of the resource bandwidth. Similarly, larger startups have the flexibility to deploy resources appropriately to take advantage of interorganizational cooperation. Smaller startups are resource constrained and therefore do not have the flexibility and hence may not be able to realize the full benefits of cooperative relationships in the network (Rothaermel, 2002).

Hence, I hypothesized that:

H₄: Startup size positively moderates the impact of relational embeddedness on startup success such that the relationship between relational embeddedness and startup success is stronger in larger firms.

Impacts of Coordination Mechanisms

In this section, I describe the impacts of formal and informal coordination mechanisms on each of the dimensions of relational embeddedness.

Formal coordination mechanisms and interorganizational trust. In an interorganizational setup, coordination can be defined as the extent to which organizations take into account those of other organizations in the network (Hall et al., 1977). Consistent with Faraj and Xio (2006), interorganizational coordination is defined as the integration of organizational work under conditions of task interdependence and uncertainty. One of the ways to accomplish interorganizational coordination is through collecting and processing of information. Viewed through an information processing theory lens, organizations reduce uncertainty through information processing (Galbraith, 1973; Tushman & Nadler, 1978). Formal coordination encompasses rules, procedures, formal meetings, and contracts, all of which seek to reduce uncertainty through exchange of information at regular intervals. To the extent it stipulates essential behaviors ahead of executing tasks, it is the simplest technique for coordinating interdependent tasks (Galbraith, 1994).

As defined previously, interorganizational trust is an “expectation that alleviates the fear that one’s exchange partner will act opportunistically” (Gulati, 1995, p. 91). Applying the definition of trust put forth by Rousseau, Sitkin, Burt, and Camerer (1998), interorganizational trust is a psychological state comprising the intention to accept vulnerability by one organization

based upon positive expectations of the intentions or behavior of another (p.395). As formal rules, procedures, formal meetings, and contracts take hold, I posited that each partner creates an expectation of intentions or displays specific behavior(s) that garner interorganizational trust. Formal rules, procedures, and meetings provide an opportunity for each partner to assess the others' technical capabilities (Moran, 2005), determine the ability to deliver expected outcomes, and demonstrate congruence of interests. Thus, formal coordination mechanisms provide for transparency (Rousseau, Sitkin, Burt, & Camerer, 1998) based on which partner organizations can accept a level of vulnerability to other organizations in the network.

On the one hand, formal coordination mechanisms lay out expectations of each other in the interorganizational set up; on the other, during the interactions as a result of formal rules, procedures, meetings, and so forth, partners either verify their good intent and solidify their competence and capability (Nahapiet & Ghoshal, 1998) or drop off. As behaviors are fully on display, the partners develop trust based on actual experience (Moran, 2005).

Therefore, I hypothesized that:

H₅: Formal coordination mechanisms have a positive impact on interorganizational trust.

Formal coordination and interorganizational cooperation. Since all economic transactions are embedded in their social context (Granovetter, 1985), interorganizational cooperation is pervasive and driven by socioeconomic interests. Interorganizational cooperation is defined as “the combined quest of agreed-on objectives in a manner corresponding to a shared understanding about contributions and payoffs” (Gulati et al., 2012, p. 6). Formal coordination mechanisms can bring together interested organizations within fora to coalesce towards an agreed upon set of objectives. Mechanisms such as formal rules, meetings, and contracts can provide the environment for organizations to commit resources in order to reach their goals.

Since cooperation occurs as a two-way phenomenon, this could range from time, resources, and market access to the acquisition of intellectual property, more efficiency, or better acceptability (Gulati et al., 2012).

For instance, Norbert Technologies—a New York based startup—went through a series of rules, procedures, and meetings in 1998 which later developed into a cooperative relationship with Sears Roebuck & Co. (Datz, 2003). The negotiations yielded an understanding of each party's contribution to the cooperative relationship, shared objectives, and mutual expectations. The commitment Norbert Technologies made in terms of technology personnel, their base product Corworks, and their time and effort matched those of GE Capital's internal resources, including managerial time and commitment. The regularly scheduled interface between the two organizations was based on agreed upon rules and procedures, enabling the building of interorganizational cooperation. This led to Norbert Technologies to advance its legitimacy in the marketplace and GE Capital to implement a unique software solution in their credit card division. Therefore, regardless of the alignment of goals (shared objectives), this partnership still required coordination (rules, procedures, meetings, and contract) to work towards a cooperative relationship. Hence, I postulated that:

H₆: Formal coordination mechanisms will have a positive impact on interorganizational cooperation.

Formal coordination and interorganizational network building. Mitchell (1969) defined a network as a “specific set of linkages among a defined set of persons with the additional property that the characteristics of these linkages as a whole may be used to interpret the behavior of the persons involved” (p. 2). Consistent with Mitchell's (1969) definition, we may describe an interorganizational network as a specific set of linkages among a distinct set of

organizations with the additional property that the characteristics of these linkages as a whole may be used to interpret the behavior of the organizations involved. In essence, from a network and relational theoretic perspective, a social network is a set of network members—in this case organizations—that are connected by relations. Firms have network connections not only at the top-management level, but also at the transactional level (Granovetter, 1985).

Formal coordination mechanisms can have a positive impact on interorganizational network building. Formal rules of engagement and regularly scheduled meetings and contracts determine common expectations, set up acceptable norms of behavior, foster interorganizational commitment, and can bind together the disparate membership of a network. In turn, a successful network attracts new members to the network, thus replenishing and building it. As elaborated previously, organizations need quality information to cope with environmental uncertainty which is inherent in the marketplace (Galbraith, 1973). Formal coordination mechanisms can help synchronize and integrate activities of various actors in the network to enable appropriate processing of information flow through the advisory group or group of trustees. As an illustration, a startup may have a user group or advisory board that has formal coordination mechanisms such as formal rules of engagement, clear mission, procedures to communicate with the startup, and regular meetings, such as quarterly, semi-annual, or annual get-togethers. Due to this formal regime, the network can become a potent conduit for information exchange and has a transformative and profound impact on the startup. Consequently, I postulated that:

H₇: Formal coordination mechanisms will have a positive impact on interorganizational network building.

Informal coordination and trust. Interorganizational informal coordination mechanisms can be defined as spontaneous interorganizational interactions that lead to

information sharing (Balaji & Brown, 2014). Extending the notion of the informal organization of Galbraith (1994), these spontaneous interactions are developed on a personal relationship basis. These unprompted interactions across organizations are exogenous to organizational rules and procedures and relationships are created outside the ambit of the formal interorganizational regime (Galbraith, 1994).

It is often said that information exchanges at the water cooler have significant bearing on organizational practices (DiFonzo, 2008). Extending this notion across organizations, casual, spontaneous interorganizational interactions act as a catalyst for meaningful dialogue as informal interactions kick off the metaphorical water-cooler—the historically perfect organizational setting for informal dialogues (Fayard & Weeks, 2007). As interactions take place outside the contours of rules and procedures, organizations and their representatives assess each other in their natural state, which goes a long way in establishing trust. An important consequence of informal coordination is open and honest communication unfiltered by rules and procedures leading to trust. The interorganizational experience is strengthened by informal coordination mechanisms as interorganizational trust is built one step at a time (Gulati, 1995).

Informal coordination mechanisms can have a positive impact on interorganizational trust. Informal interactions authenticate behavioral integrity and generosity of partners which can drive interorganizational trust between partners (McEvily et al., 2003). Trust develops as a result of consistency of behavior and the fulfillment of expectations, and informal coordination mechanisms can help develop such notions of trust. Expectations surface through interorganizational interactions and information exchange, and trust as an “attitude or state of mind” is developed because of experience with others (Bachmann & Inkpen, 2011, p. 4). Hence, I hypothesized that:

H₈: Informal coordination has a positive impact on interorganizational trust.

Informal coordination and interorganizational cooperation. Given that interorganizational coordination is the “deliberate and orderly alignment or adjustment of partners’ actions to achieve jointly determined goals” (Gulati, Wohlgezogen, & Zhelyazkov, 2012, p. 6) through subtle means that are unconstrained by rules, procedures, and contracts, the question becomes, how does that lead to cooperation? The information processing theoretic view suggests that order is established via information interchange and responses thereof, which have the effect of reducing uncertainty (Galbraith, 1994). Informal coordination inspires organizations to embed transactions within a social context that is conducive to interorganizational cooperation (Dekker, 2004). A concrete manifestation of interorganizational cooperation is the exchange of tacit information between partners (Dyer & Singh, 1998). Informal exchange is an antecedent to determining congruency of values, norms, and mutual objectives, which in turn develops into cooperation (Ring & Van de Ven, 1994). Moreover, as organizations assess each other against an informal backdrop, the interchange progresses to resource alignment—a posture of give and take. This can lead to higher cooperation between partners. Hence, I postulated that:

H₉: Informal coordination will have a positive impact on interorganizational cooperation.

Informal coordination and network building. The prominence of networks cannot be understated; Granovetter (1985) argued that firms are connected not only at the top levels but at all levels of transactions in organizations. This is particularly true for startups as they are reliant on personal relations and informal contacts. By definition startups lack resources and increasingly rely on their networks. Because of the newness of startups, they have to necessarily depend on their informal social contacts to build their networks. There is a general consensus on

what constitutes a social network. A social network can be described as a set of persons or organizations connected by a set of well-defined social interactions, such as friendships or common interests (Gulati, 1998). These interactions are often a product of informal contacts.

Informal communication practices go a long way in helping to build a network of relationships (Galbraith, 1994). According to a research study conducted by the Economic Intelligence Unit (EIU) of the Economist, 78% of startups surveyed said the informal environment is crucial to their success (EIU, 2016). The EIU research clearly suggests that networks based on informal contacts serve to fill a big void for startups in identifying resources critical to the success of the startup. The voluntary and spontaneous nature of informal coordination establishes rapport, breaking down any unconscious walls of resistance that may exist. The net effect is that informal coordination leads to better network building (Galbraith, 1994). Hence, I postulated that:

H₁₀: Informal coordination has a positive effect on startup network building.

Methods

Sampling Design and Procedures

In this paper, I adopted the positivist survey approach for collecting data for my study. Despite the dichotomy in entrepreneurship research in terms of utilizing positivist and constructionist paradigms, the positivist approach is predominant across the field (Tatli, Vassilopoulou, Özbilgin, Forson, & Slutskaya, 2014). Further, this study focused on theory testing (Yin, 2003), and hence a positivist survey was best suited for my purpose.

The target population for this study consisted of startup firms which had been established at least for two years. The survey measures were initially validated by a small group of academic and practitioner experts. Face and content validity were established through the expert

review process. This was followed by a pilot study with a convenience sample consisting of 15 participants. The survey measures were modified based on the responses in the pilot study. Once the survey was revised, a multiple wave survey approach was conducted with the online survey administered by Qualtrics. Participants across the United States were invited to respond to the survey with a goal of acquiring a minimum of 200 responses. Participants were provided a financial incentive to participate in the study. I used the following filter questions for filling out the survey: Participants a) need to be 18 years or older, b) need to have an intimate knowledge of the dynamics of the startup's relationship with the startup partners, and 3) need to be a C-level executive, founder, or owner of the startup to respond to the survey. Further, survey participants were guaranteed anonymity of their responses.

I used Smart PLS 3.0 for analyzing the responses from the final survey. Following Hair et al. (2011), Partial Least Squares -Structural Equation Modeling (PLS-SEM) is an established analytic procedure to establish cause-effect relationships between latent constructs. It not only maximizes the explained variance of the dependent latent constructs but also assesses data quality via measurement model characteristics. According to Chin (1998), the partial least squares approach to structural equation modeling is a powerful yet flexible technique that can be used to suggest the existence of relationships and test theory. Reliability estimates, convergent and discriminant validity, and factor scores were validated using established statistical techniques and standards (Fornell & Larcker, 1981; Nunnally, 1979).

According to Chin (1998), the minimum sample requirement for consistency of results using PLS is 10 times of the number of incoming arrows into a construct. A minimum of 125 survey responses was planned to be obtained for this study, which is larger than the required minimum in PLS. However, the number of responses was 220, far exceeding the planned minimum.

Scale Development and Measures

The final survey measures are provided in Appendix A. As indicated previously, scale development and measures were based on prior research and modified appropriately to the context of startups considering the expert review and the pilot study.

Dependent variable : Startup success. To the extent startup businesses have a very low survival rate (26%) at the end of five years (Mason, 2017), startup success can be expressed in several ways: year over year sales growth, return on investment, 5–10-year survival, and so forth (Walter & Parboteeah, Riesenhuber & Hoegl, 2011). In the present study, following Yli-Renko, et al. (2001) and Walter et al. (2011), startup success was defined as year over year sales growth—a representation of the extent to which customers value a startup firm's products. Year over year sales growth was an appropriate measure of success for two reasons. First, startups by definition are geared towards year over year growth (Ireland, 2017). Second, it is a direct measure of customer acceptance of the startup's products or service offerings in the marketplace. In addition, I also measured total sales over five years and years of operation over five years. I also adapted organizational outcomes to the startup context and developed reflective items of startup success, in addition to these quantitative measures.

Firm size. In this study, firm size was measured using the number of employees in the startup. Several prior studies have used number of employees as the measure of firm size, especially relating to startups and information technology (Brynjolfsson, Malone, Gurbaxani, & Kambil, 1994; Jiang, 2003; Rajan, Kumar, & Zingales, 2001). In these studies, firm size typically has been measured using number of employees, weighted average, or otherwise. Therefore, firm size was measured as the number of employees in this study.

Interorganizational trust. Cummings and Bromiley (1996) offered a conceptual,

empirically developed, and validated measure of organizational trust; they presented two forms of organizational trust inventory—the short form and the long form—based on both behavior and belief. Similarly, Cook and Wall (1980), looked at interpersonal trust at work attributing “good intentions to and [having] confidence in the actions of other people;” the authors focused on intra-organizational trust affecting interpersonal relationships. Moran (2005) presented a concise measure of relational trust reflecting social capital. I incorporate the aforementioned measures in this study but modified them appropriately. For example, Cummings and Bromiley (1996) based measures on behavior and belief. I chose behavior and modified scales to make it concise. Moran (2005) developed a trust measure—a three-item scale—in part based on Cook and Wall (1980). Although, the measure was targeted at intra-organizational trust, it can be applied to interorganizational trust, as well.

Interorganizational cooperation. O’Brien (1968) in the seminal article on the measurement of cooperation, lists two basic forms of cooperation: collaboration and coordination. Since coordination is a separate and distinct measure, I opted to use collaboration. More importantly, in the theoretical framework I posited coordination mechanisms as antecedents to relational embeddedness (trust, cooperation, and network building). The objective was to identify interorganizational cooperation within the network.

Interorganizational network building. I proposed to measure interorganizational network building with the goal of identifying openness, information exchange, and information flow. Whereas scholars have measured various aspects of network, such as network competence (Ritter et al., 2002) and network structure (Milward & Provan, 1998), I developed new measures for this construct to specifically focus on the open–closed nature of the network (Burt, 2002) and information flow and exchange. This new measure was consistent with my theorization of network building in the context of startups (Baum, Calabrese, & Silverman 2000; Greve &

Salaff, 2003).

Informal and formal coordination mechanisms. Several scholars have come up with measures for informal and formal coordination all in different contexts. For example, Van de Ven et al. (1976) proposed a measure for intra-organization coordination mechanisms with the objective of classifying coordination modes into impersonal, personal, and group modes. Espinosa, Lerch, Kraut, Salas & Fiore (2004) viewed the coordination measure from an explicit and implicit coordination perspective within teams in an organization. More in line with the present study because of its interorganizational nature, Balaji and Brown (2014), studying lateral coordination mechanisms in information systems development outsourcing, concluded formal and informal coordination mechanisms have beneficial impacts; the authors used measures based on Galbraith (1994) and prior information systems literature. Since the measures are information technology focused, I appropriately modified them for the present study.

Control variables. Based on prior research (He & Wong, 2014; Rothaermel & Alexandre, 2009), the following control variables were included: size of firm, age of firm, and industry the firm belongs to. Accordingly, data on the size of the firm (number of employees), the number of years the firm has been in business, and industry type were collected.

Analysis and Results

In this section, I discuss the analysis of data and interpretation of results including measurement and structural models.

Measurement Model

An examination of the skewness and kurtosis revealed that the measurement model was within well-established standards of normality.

Construct reliability was established by verifying the Cronbach's alpha and internal consistency reliability values were greater than 0.7 (Table 2.1; Nunally, 1979). To establish construct validity, I followed the steps outlined in Gefen and Straub (2005) for Partial Least Squares (PLS). The Average Variance Extracted (AVE) values for all the constructs were greater than 0.5 (Table 2.1). Further, the loadings for the items had *t*-values greater than 1.96 (Table 2.2; Gefen & Straub, 2005), thereby establishing convergent validity (Fornell & Larcker, 1981).

Table 2.1 Construct Reliability and Average Variance Extracted

Construct	Cronbach's Alpha	Rho A	Composite Reliability	AVE
Cooperation	0.896	0.896	0.935	0.828
Formal Coordination Mechanisms	0.907	0.913	0.928	0.683
Informal Coordination Mechanisms	0.809	0.840	0.887	0.724
Network	0.931	0.932	0.946	0.743
Startup Success	0.933	0.937	0.949	0.789
Trust	0.885	0.893	0.928	0.812

Note: Rho A is a Reliability Coefficient
 AVE is Average Variance Extracted

To establish discriminant validity, Gefen and Straub (2005) proposed two techniques: a) item-to-construct correlations for the intended construct should be greater than those of other constructs and b) the square root of the AVE for the intended construct should be greater than the correlations with other constructs. Table 2.2 shows that item-to-construct correlations for the intended construct are greater than the item-to-construct correlations of other constructs. An examination of Table 2.3 revealed that the square root of AVE for each construct was greater than the corresponding correlation values as expounded by Fornell & Larcker (1981). Thus, discriminant validity was established.

Table 2. 2 Outer Model Loadings

Construct	Item	Measure	<i>t</i> -Statistic
Cooperation	COPN_1	Our partners have an history of cooperating with our startup.	54.495
	CPON_2	Our partners find cooperation with our startup to be mutually beneficial.	48.988
	COPN_3	Our startup can count on the cooperation of our partners.	49.068
Formal Coordination Mechanisms	FCM_1	Our startup has regular meetings with our partners to discuss about our engagements (e.g., current/new partners).	22.964
	FCM_2	Our startup has well designed techniques (e.g., scorecards, matrices) to track progress of engagements (e.g., current/new projects) with our partners.	37.856
	FCM_3	Our startup has well-established mechanisms (e.g., conflict resolution terms) to resolve issues with our partners.	33.165
	FCM_4	Our startup has well established committees (e.g., R&D committee, production committee) for coordinating with our partners.	25.158
	FCM_5	Our startup has clearly defined service level (SLAs) with our partners.	19.515
	FCM_6	Our startup has clearly defined service level agreements (SLAs) with our partners.	45.503
Informal Coordination Mechanisms	IFCM_1	Our startup encourages our employees to foster good working relationships with our partners.	51.237
	IFCM_2	Our startup has informal review meetings with our partners.	15.103
	IFCM_3	Our startup has friendly relationships with employees of our partners.	61.053
Network	Network_1	Our startup has leveraged the network to seek new alliances with other firms.	26.208
	Network_2	Our startup has gained critical information (e.g., emerging technology) by being involved in this network.	42.241
	Network_3	Our startup has leveraged the network to seek new alliances with other firms.	58.639
	Network_4	Our startup has leveraged the network to learn new, innovative ideas.	38.481
	Network_5	Our startup has gained critical information (e.g., emerging technology) by being involved in this Item	41.945

Continued

Construct	Item	Measure	t-Statistic
Trust	Network_6	There is free flow of information from this network.	26.551
	Trust_1	Our partners can be trusted without fear that we will be advantage of eve though the opportunity arises.	33.370
	Trust_2	Our partners always keep promises made to us.	56.725
Startup Success	Trust_3	Our partners cab ne relied on to help us if the need arises.	45.818
	Success_1	Our sales have grown in the last five years.	46.065
	Success_2	Our customers have enthusiastically accepted our products/services.	23.824
	Success_3	We have been able to regularly add customers.	37.95
	Success_4	Our customer list has grown significantly in the last five years.	63.264
	Success_5	Our year over year sales growth has been positive.	60.901

Note: R&D is Research and Development

SLA is Service Level Agreement

COPN1-3 – Items for Interorganizational Cooperation

FCM 1-6 – Items for Formal Coordination Mechanisms

IFCM 1-3 – Items for Informal Coordination Mechanisms

Network1-6 - Items for Interorganizational Network Building

Success1-5 - Items for Startup Success

Trust1-3 – Items for Interorganizational Trust

Table 2.3 Item-to-Construct Correlations

Items	Int. Cooperation	Formal Coordination Mechanisms	Informal Coordination Mechanisms	Int. Network	Startup Success	Int. Trust
COPN_1	0.928	0.409	0.658	0.552	0.258	0.747
COPN_2	0.904	0.439	0.625	0.594	0.315	0.667
COPN_3	0.897	0.509	0.609	0.578	0.331	0.779
FCM_1	0.387	0.793	0.583	0.52	0.231	0.322
FCM_2	0.421	0.866	0.551	0.581	0.313	0.335
FCM_3	0.473	0.865	0.607	0.646	0.299	0.434
FCM_4	0.304	0.808	0.43	0.486	0.304	0.284
FCM_5	0.489	0.765	0.651	0.523	0.277	0.364
FCM_6	0.357	0.856	0.562	0.584	0.305	0.329
IFCM_1	0.658	0.551	0.885	0.576	0.245	0.502
IFCM_2	0.395	0.668	0.756	0.52	0.215	0.329
IFCM_3	0.673	0.576	0.905	0.584	0.264	0.536
Network_1	0.667	0.537	0.643	0.81	0.202	0.608
Network_2	0.558	0.554	0.529	0.875	0.252	0.472
Network_3	0.503	0.601	0.558	0.896	0.313	0.497
Network_4	0.501	0.557	0.57	0.876	0.192	0.409
Network_5	0.489	0.558	0.536	0.879	0.208	0.427
Network_6	0.545	0.687	0.557	0.834	0.253	0.46
Success_1	0.289	0.341	0.24	0.248	0.888	0.238
Success_2	0.317	0.244	0.301	0.221	0.828	0.248
Success_3	0.268	0.248	0.224	0.201	0.894	0.186
Success_4	0.272	0.358	0.244	0.287	0.91	0.217
Success_5	0.328	0.345	0.262	0.265	0.917	0.223
Trust_1	0.688	0.34	0.422	0.463	0.196	0.899
Trust_2	0.731	0.42	0.502	0.532	0.238	0.915
Trust_3	0.746	0.375	0.542	0.504	0.236	0.889

Continued

Note: COPN_1 - COPN_3 – Items for Interorganizational Cooperation (Int. Cooperation)

FCM_1 – FCM_6 – Items for Formal Coordination Mechanisms

IFCM_1 – IFCM_3 – Items for Informal Coordination Mechanisms

Network_1 – Network_6 - Items for Interorganizational Network Building (Int. Network)

Success_1 – Success_5 - Items for Startup Success

Trust_1 – Trust_3 – Items for Interorganizational Trust (Int. Trust)

Table 2.4 Measurement Model Validation

Constructs	Int. Coop.	Formal CM	Informal CM	Int. Network	Startup Success	Int. Trust
Int. Coop.	0.910					
Formal CM	0.457	0.869				
Informal CM	0.586	0.749	0.809			
Int. Network	0.468	0.625	0.619	0.905		
Startup Success	0.333	0.35	0.307	0.27	0.888	
Int. Trust	0.829	0.438	0.499	0.526	0.282	0.886

Note: Int. Coop - Interorganizational Cooperation
 Formal CM - Formal Coordination Mechanism
 Informal CM - Informal Coordination Mechanism
 Int. Network - Interorganizational Network Building
 Int. Trust – Interorganizational Trust

Structural Model

The structural model that was tested in this study is shown in Figure 2.2. The path coefficients are shown for each relationship along with the p -values. Significant paths are shown in bold. I discuss the findings from the structural model analysis in the following paragraphs.

H_1 stated that interorganizational trust will have a positive impact on startup success. Interorganizational trust was not found to have a significant impact on startup success ($\beta = -.050$; $t = 0.441$). So, H_1 was not supported.

H_2 stated that interorganizational cooperation will have a positive impact on startup success. Interorganizational cooperation had a positive impact on startup success ($\beta = 0.308$; $t = 2.515$). Therefore, H_2 was supported.

H_3 stated that startup participation in networks will have a positive impact on startup success. Startup participation in networks did not have a significant impact on startup success ($\beta = 0.044$; $t = 0.452$). Therefore, H_3 was not supported.

H_4 stated that startup size will positively moderate the impact of relational embeddedness on startup success. The analysis showed that firm size had a significant positive main effect on startup success ($\beta = 0.206$; $t = 3.067$). Further, the moderating effect of firm size on the link between trust and startup success was significant ($\beta = 0.196$; $t = 1.976$). Therefore, H_4 was partially supported.

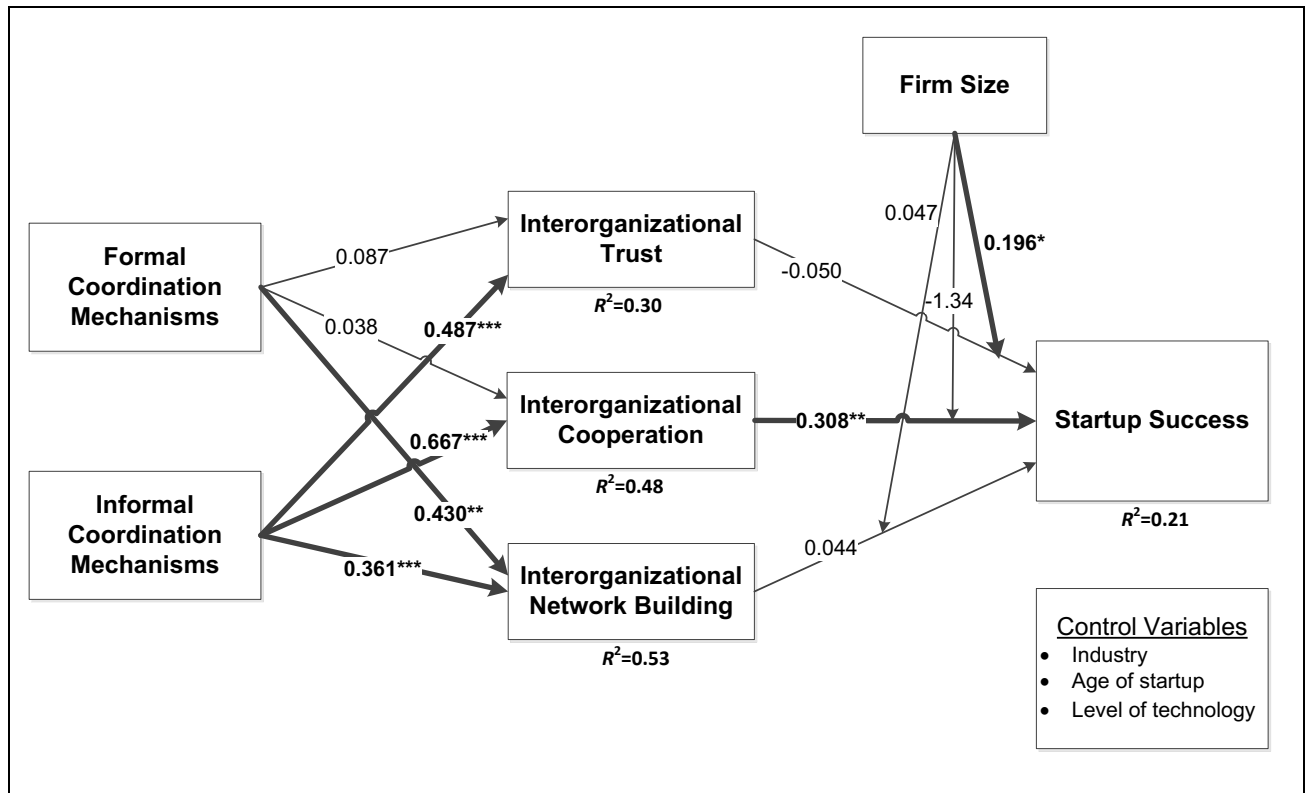


Figure 2.2. Structural model for relational embeddedness.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Supported hypotheses are represented using bold lines.

H_5 stated that formal coordination mechanisms will have a positive impact on interorganizational trust. Formal coordination mechanisms did not have a positive impact on trust ($\beta = 0.087$; $t = 1.087$). Therefore, H_5 was not supported.

H_6 stated that formal coordination mechanisms will have a positive impact on interorganizational cooperation. Formal coordination mechanisms did not have a positive impact on cooperation ($\beta = 0.038$; $t = 0.518$). Therefore, H_6 was not supported.

Table 2.5 List of Hypotheses

Hypothesis	β , t -values	Supported / Not Supported
H_1 : Interorganizational trust will have a positive impact on startup success.	$\beta = -0.050$ $t = 0.441$	Not Supported
H_2 : Interorganizational cooperation will have a positive impact on startup success.	$\beta = 0.308^{**}$ $t = 2.515$	Supported
H_3 : Startup participation in networks will positively impact startup success	$\beta = 0.044$ $t = 0.452$	Not Supported
H_4 : Startup size will positively moderate the impact of relational embeddedness on startup success such that the relationship between relational embeddedness and startup success is stronger in larger firms.	<u>H4a: Trust</u> $\beta = 0.196^*$ $t = 1.976$ <u>H4b: Cooperation</u> $\beta = -1.34$ $t = 1.387$ <u>H4c: Network</u> $\beta = 0.047$ $t = 0.458$	Partially supported (Trust x Firm Size)
H_5 : Formal coordination mechanisms will have a positive impact on interorganizational trust.	$\beta = 0.087$ $t = 1.087$	Not Supported
H_6 : Formal coordination mechanisms will have a positive impact on interorganizational cooperation.	$\beta = 0.038$ $t = 0.518$	Not Supported
H_7 : Formal coordination mechanisms will have a positive impact on interorganizational network building.	$\beta = 0.431^{***}$ $t = 6.001$	Supported
H_8 : Informal coordination will have a positive impact on interorganizational trust.	$\beta = 0.487^{***}$ $t = 6.780$	Supported
H_9 : Informal coordination will have a positive impact on interorganizational cooperation	$\beta = 0.667^{***}$ $t = 10.673$	Supported
H_{10} : Informal coordination will have a positive effect on startup network building.	$\beta = 0.361^{***}$ $t = 4.500$	Supported

Notes: $*p < 0.05$, $**p < 0.01$, $***p < 0.001$; Supported hypotheses are represented in bold.

H_7 stated that formal coordination mechanisms will have a positive impact on network

building. Formal coordination mechanisms had a significant positive impact on network building ($\beta = 0.43$; $t = 6.001$). Therefore, H_7 was supported.

H_8 stated that informal coordination mechanisms will have a positive impact on interorganizational trust. Informal coordination mechanisms had a significant positive impact on trust ($\beta = 0.487$; $t = 6.780$). Therefore, H_8 was supported.

H_9 stated that informal coordination mechanisms will have a positive impact on interorganizational cooperation. Informal coordination mechanisms had a significant positive impact on cooperation ($\beta = 0.667$; $t = 10.673$). Therefore, H_9 was supported.

H_{10} stated that informal coordination mechanisms will have a positive impact on network building. Informal coordination mechanisms had a significant positive impact on network building ($\beta = 0.361$; $t = 4.500$). Therefore, H_{10} was supported.

The impacts of control variables—age of startup ($\beta = -0.77$; $t = 1.245$), type of industry ($\beta = -0.042$; $t = 0.665$), and level of technology ($\beta = -0.085$; $t = 0.213$) on startup success—were not found to be significant.

Overall, the model explained an R^2 of 0.30 for trust, 0.48 for cooperation, 0.53 for network building, and an R^2 of 0.21 for the dependent variable, startup success.

Common Method Bias Test

Common method bias is the result of variance that can be ascribed to the measurement method itself rather than to the concerned construct (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). Podsakoff et al. (2003) proposed statistical and non-statistical remedies to identify and resolve common method bias (variance) in the responses. Statistical remedies include Harman's

single factor (Podsakoff & Organ, 1986), to determine whether in large part the items load on to a single factor. Harman's single factor test revealed that a single factor did not account for all the items in the study. I also utilized a marker variable approach for testing and controlling common method bias (Podsakoff, 2003). The survey included a set of three questions completely unrelated to any other construct in the study as the marker variable.

Kock (2015) detailed a procedure based on full collinearity for testing common method bias using marker variables, suggesting a Variance Inflation Factor (VIF) of 10 as the minimum threshold for the identification of common method bias. My findings revealed that although some marker variable relationships were significant, the examination of collinearity statistics (VIF) found that none of the VIF values were greater than 10. Further, Podsakoff et al. (2003) asserted that social desirability-based common method bias may be addressed via ensuring anonymity and reducing evaluation anxiety. As stated previously, the survey responses were guaranteed to be anonymous and confidential and potential respondents were under no obligation to complete the survey. This ensured that respondents were filling out the survey of their own volition. Taken together, common method bias did not significantly impact the findings of this study.

Discussion

Much scholarly attention has been given to the role of formal and informal coordination mechanisms in business settings in general and in specific instances, such as innovation, new product development, management of strategic alliances, supply chain management, and so forth (Cousins, Handfield, Lawson, & Petersen, 2006; Lawson, Petersen, Cousins, & Handfield, 2009; Poppo & Zenger, 2002). Most of these scholarly efforts have been presented from the perspective of a large firm. The startup view is sparse at best and absent at worst. Startups have

an imperative to succeed and do so with rapidity, and therefore a startup-centric governance regime takes on a level of urgency.

This study makes three significant contributions to the literature. First, this dissertation puts forth a theory towards a startup entrepreneurial governance model focusing on the formal and informal governance mechanisms. Each of the informal coordination links to trust, cooperation, and network building were significant and strong, establishing the primacy of informal coordination mechanisms. Similarly, network building was positively impacted by formal mechanisms. The results presented an interesting point of view that strengthens the information processing perspective in startups by lending credence to the notion of formal coordination and informal coordination mechanisms (Galbraith, 1994). Results from the present study clearly showed that formal coordination mechanisms in and of themselves are less important in enhancing interorganizational trust and cooperation and garnering cooperation from business partners than informal mechanisms. However, the results pointed towards an unambiguous role for informal coordination mechanisms in the domain of startups (Balaji & Brown, 2014).

Second, this study contributed to the understanding of the role of relational embeddedness on startup entrepreneurial outcomes. The study adds to the understanding of the startup dynamics by establishing a “theory that generates productive empirical research” (Bruyat & Julien, 2000, pp.165). Further, this study empirically demonstrated the notion that all economic transactions are rooted in social embeddedness and relations (Granovetter, 1985); this is even more so the case in startups. The direct impact of interorganizational cooperation on startup success shows that startup reliance on cooperative partnership with other firms will yield superior benefits to the startup.

Third, this study also found that firm size positively moderates the relationship between interorganizational trust and startup success. The moderating role of firm size on the link between trust and startup success shows that as firm size increases, startups can take advantage of trusting relationships to be successful. Although, trust by itself was not a significant predictor of startup success, the moderating role of firm size on trust promotes the relational embeddedness perspective in startups. This also implies that firms need to be established in the startup space in order to reap benefits from its relationships with other firms.

Study results did not support the hypothesis regarding interorganizational network building and its positive impact on startup success. The study also did not find results for the moderating role of firm size on the relationship between cooperation and network building or on startup success. Several possibilities present themselves as viable rationalizations. From a theoretical standpoint, participating in networks may be construed as an expected activity for emerging startups in that startups typically sign up to participate in some type of network to enhance their survival potential. Therefore, participating in a network in and of itself may not have contributed to startup success. Rather, the utility of the network may be a better predictor of success. Second, firm size may not have the intended moderating effect since beneficial network activity may require more time to come to fruition. In other words, although larger firms can invest more resources, network activity requires a longer time horizon to show beneficial effects.

The study results also did not support H_5 nor H_6 . H_5 stated that formal coordination mechanisms will have a positive impact on interorganizational trust. Formal coordination mechanisms did not have a positive impact on trust ($\beta = 0.087$; $t = 1.087$). Similarly, H_6 stated that formal coordination mechanisms will have a positive impact on interorganizational

cooperation. Formal coordination mechanisms did not have a positive impact on cooperation ($\beta = 0.038$; $t = 0.518$). This implies that while formal coordination mechanisms are important for firms and relationships in general, they do not lead to trust or cooperation in the case of startups.

Formal mechanisms provide the basic structural support (rules) for assembling the partners together (Balaji & Brown, 2014), while trust and cooperation are viewed as important indicators of partnership between firms. However, startups may view formal mechanisms as more routine or transactional rather than as a partnership building mechanism. Startups use formal mechanisms as a means to be part of a larger network to gain access to resources (hypothesis supported), but do not seem to perceive formal mechanisms as contributing to a partnership with other firms. Therefore, while formal coordination mechanisms provide an ordered means for connecting with partners, this in and of itself does not result in either trust or cooperation. On the other hand, the study showed it is informal coordination mechanisms that garner trust and cooperation. Taken together, in the relational embeddedness realm of startups, formal coordination mechanisms are important but have insignificant impacts on trust and cooperation compared to informal coordination mechanisms.

The findings shed light on the impact of trust and cooperation and reveal the central role of informal and formal coordination mechanisms in enriching relational embeddedness. Startups are uniquely driven by strategic alliances because of lack of resources and must adapt themselves to circumstances (Liao & Welsch, 2005). Dyer and Singh (1998, p. 661) emphasized this and suggested that a “firm’s critical resources may span firm boundaries and may be embedded in inter firm resources and routines.” As Milana and Maldaon, (2015) observed, interorganizational exchanges become more meaningful when they are coordinated. Consequently, even under loosely styled network ties, establishing formal and informal coordination mechanisms may yield positive benefits for entrepreneurships and particularly for startups (Burt, 2000, 2002).

Implications for Research and Practice

Although I focused on a relatively parsimonious model, future research can expand on the findings from this study in important ways. I discuss the implications for research and practice in this section.

Implications for Research

This study has several research implications. The notion that startups are but a microcosm of the larger business ecosystem is well-established. Therefore, from an entrepreneurial research perspective, this study focused exclusively on startups in attempting to understand governance mechanisms and relational embeddedness that impact startup success.

Future research can develop these ideas further in three distinctive ways. First, by focusing on structural embeddedness in addition to relational embeddedness, future research can expand on the findings from this study. Moran (2005) alluded to the importance of structural embeddedness; in the seminal work, the author noted that it is not only important to analyze the richness of a startup's relational embeddedness, but it is also equally important to look at how these relations are structured. Therefore, future research can study the impacts of structural embeddedness dimensions such as centrality and connectivity on startup success. Further, future research can also look at the combined influence of relational and structural embeddedness on innovation outcomes, which would be a critical supplement to the literature. All economic activity can be traced back to social relations (Granovetter, 1985b), and yet relational dynamics provide only the potential for tangible innovation success. It is the right kind of leadership that can exploit the potential and make it a reality. Therefore, more studies on effective leadership are warranted as leadership may positively moderate the impact of relational embeddedness on innovation outcomes.

Second, this study empirically established that both formal and informal coordination mechanisms are needed, but informal coordination mechanisms are probably more important for startups for building relational embeddedness. This is a key finding as it points to the important role of informal mechanisms in building relationships in startups. This finding also opens up opportunities for future research into the kinds of informal coordination that are fruitful to a startup. With increasing reliance on the internet and social media to build startup networks and partnerships, future research can also look at the effect of technological coordination as a predictor of startup success.

Third, this study pointed to firm size as a moderator to relational embeddedness in predicting success. This provides an opportunity for future researchers to look at firm size as a step function. Stated differently, when does size become a bane rather than a boon? Taken together with formal and informal mechanisms, how must firms structure their coordination mechanisms to be successful? This also affords a great opportunity for future research to delve into the optimal balance between formal and informal coordination in such settings.

Implications for Practice

This study also has important implications for practitioners. First, this study provides a road map for startups to succeed in their endeavors. Trust, cooperation, and network building—key ingredients in startup relationships—are bolstered by informal coordination mechanisms, while network building is improved through formal mechanisms. In other words, the water-cooler effect can have a powerful impact on startup relationships. Therefore, clearly formal coordination mechanisms are important, but robust informal mechanisms can foster more meaningful relationships with other firms.

Second, this study showed that interorganizational cooperation has a positive impact on

startup success. Therefore, startups need to invest in building cooperative relationships with other firms in order to be successful. While startup firms have their eye on growth (and sometimes survival), cooperative relationships can help startups tide over their problems.

Third, startups, whether they are self-funded or funded by venture capitalists, ought to consider having flexible resources to expand their networks and build informal relationships. This study pointed to size as an indicator of success. Prior works has shown that firm size acts as a proxy for the availability of resources. Therefore, in practice, this may also mean startups need to acquire more resources to avail themselves of the full benefits of their relationships with other firms.

Limitations

This study also has some limitations. First, the study was conducted with a sample size of 220. A larger sample would not only confirm the findings of the study but also add to the rigor of the study.

Second, although this study examined the impacts of formal and informal mechanisms and the role of relational embeddedness in startups, it did not examine the quality of relationships among startups. In other words, relationship formation and quality could be dependent on the need of the startup and could vary by size, industry, and location. Therefore, this study could not theorize on the impacts of quality of relationships, which is an important consideration in relational embeddedness.

Finally, although this study was conducted across industries, I could not find support for the hypothesis on network building. Perhaps a more focused qualitative study on specific industries could shed more light on the role of network building on startup success.

Conclusion

In summary, this study addressed a critical gap in the literature on startups by delving into the formal and informal governance mechanisms and relational embeddedness aspects. The study makes important contributions to the literature by theorizing on the role of coordination mechanisms and relational embeddedness on startup success. Empirical results pointed to the important role of informal coordination mechanisms in enhancing trust, cooperation, and network building; formal mechanisms were found to have a direct role in enhancing network building. Cooperation was found to have a direct effect on startup success, while the impact of trust on startup success was moderated by firm size. Future research can expand on this study in important directions such as on structural embeddedness, coordination mechanisms, and other moderating influences. Practitioners can also use this study to better coordinate startups and to build effective relationships to achieve startup success.

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CHAPTER 3: EXPLORE AND EXPLOIT INFORMATION TECHNOLOGY? THE ANTECEDENTS AND CONSEQUENCES OF TECHNOLOGY AMBIDEXTERITY IN STARTUPS

ABSTRACT

Increasingly, information technology (IT) plays a crucial role in driving growth in an entrepreneurial environment, especially among startups. Although technology ambidexterity—the ability of a business to focus on two competing technology goals—has been studied from various perspectives in IT literature, its significance and impacts on startups has remained underexplored. In this study, I posited that technology ambidexterity has a positive impact on startup success. Further, organization technology factors including IT strategic vision, IT strategic thinking, IT absorptive capacity, and IT market orientation were modeled as antecedents and were hypothesized to have positive impacts on technology ambidexterity. Partial least squares structural equation modeling techniques were utilized to test the structural model. Based on the analysis of 220 startups, findings show that technology ambidexterity has a positive impact on startup success. IT strategic vision, IT strategic thinking and IT-enabled

market orientation positively impacted technology ambidexterity, highlighting the mediating role of technology ambidexterity. This study has important academic and practical implications for startups seeking to network with other firms and utilize technology to achieve growth.

Keywords: Technology ambidexterity, Information Technology (IT) strategic vision, Information Technology strategic thinking, Information Technology absorptive capacity, Information Technology market orientation, startup success.

Explore and Exploit Information Technology? The Antecedents and Consequences of Technology Ambidexterity in Startups

The business environment can be characterized as intensely competitive, resulting in the introduction of radical and disruptive changes by entrepreneurial competitors (Vorbach, Mueller, & Egger, 2016). According to Crane (2012), rapid transformation is one of the most durable prompts of entrepreneurial activity. The *2016 Global Information Technology Report* highlighted the exponential speed of development driven by technology, sweeping across all industries and impacting management, governance, and a whole host of other areas (Baller et al. 2016). As a result, entrepreneurial firms, especially startups, are increasingly adapting a more technology-centric model. Notably, even established industries are being shaken up by startups capitalizing on technological capabilities. For instance, according to the McKinsey Report, 2017, technology savvy insurance startups termed *insurtechs* (e.g., Lemonade, BIMA, Inshared) use technology to ensure immediate digital transactions across digital channels, peer-to-peer insurance and brokerage, and upending existing business models. Thus, information technology (IT) has become a powerful enabler of startup activity by not only providing digital customer interfaces for sales and service for operations but also by introducing new products and services.

Startups, however, can no longer focus on just investing in one type of technology but need to be ambidextrous in technology use. Startups face the daunting challenge of achieving year over year growth in order to survive (Ireland, 2017). Due to the hypercompetitive environment and pressures to grow sales, startups need to not only exploit current technologies but also explore novel technologies (Schreuders & Legesse, 2012). In this study, this dual technology focus is referred to as technology ambidexterity (Lee et al., 2015).

Organizational ambidexterity is broadly defined as the capability to concurrently follow

the path of exploiting current competencies while exploring new opportunities (Raisch et al., 2009; Tushman & O'Reilly, 1996). It acts as a bridge between market inclination and technological possibilities (Dougherty, 1992; Raisch et al. 2009). Several research studies have delved into the antecedents and impacts of organizational ambidexterity but from a purely organizational standpoint (Andriopoulos & Lewis, 2009; Bot, 2012; Fernhaber & Patel, 2012; Gibson & Birkinshaw, 2004; Lubatkin, Simsek, Ling, & Viega, 2006; Raisch et al., 2009; Tushman & O'Reilly, 1996; Wang & Rafiq, 2014). However, it is well established in management literature that technology plays a vital role in business (Dodgson, Gann, & Salter, 2006; Johnson, 2001; Rothwell, 1992). IT is a critical element in the decision to introduce novelty in product or service offerings.

With specific regard to startups, success entails change of the status quo and use of new techniques (Eckhart & Shane, 2003), and technology is a powerful means for accomplishing this goal. As illustrated before in the case of the insurance industry, opportunities to evaluate, explore, and exploit for startup firms are often technological in nature, and the ability to respond quickly can be predictive of firm success (Almeida, Dokko, & Rosenkopf, 2003). Consequently, technology ambidexterity assumes an amplified significance in the domain of startups. In summary, although scholars have heretofore dealt with ambidexterity from organizational and process viewpoints, technology ambidexterity has at best been understudied. To date, we do not have a holistic picture of what constitutes technology ambidexterity in startups, its technology-oriented antecedents, or its impacts on startup success.

In this study, I drew upon two theoretical perspectives to build a research model of the antecedents and consequences of technology ambidexterity. First, I drew upon the theory of ambidexterity (Tushman & O'Reilly, 1996) and prior works on IT ambidexterity (Lee et al. 2015) to develop the construct of startup technology ambidexterity and its impacts on startup

success. Second, several studies have delved into the organizational antecedents of ambidexterity (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008). Additionally, I diverged from prior studies in that I focused exclusively on the technology-oriented antecedents of technology ambidexterity. I drew upon the theoretical underpinnings of the four enabling processes—sensing, learning, coordinating, and integrating (Pavlou and El-Sawy 2006)—to focus specifically on the technology-related contextual antecedents of technology ambidexterity.

The research questions that this study sought to address were:

1. What are the impacts of technology ambidexterity on startup success?
2. What are the impacts of the technology-oriented antecedents on technology ambidexterity?

The rest of the paper is organized as follows. The next section provides a review of prior literature. The research model and hypotheses are presented next, followed by the methods section. I conclude with a discussion on the limitations and potential contributions from this study.

Literature Review

Information Technology plays a major role in shaping a firm's competitive stance, be it through operational efficiency, product innovation, or both (Bakos & Treacy, 1986; Mata et al. 1995; Powell & Dent-Micallef, 1997). Technology enables new patterns of activities, possibly eliminating old ones, and transforming the organizational landscape (Galbraith & Lawler, 1993; Lee et al. 2015). It creates a body of knowledge devoted to creating tools, processing actions and extracting materials (Ramey, 2013), and enabling novelty and innovation (Pavlou & El Sawy 2006).

Researchers contend that a firm's ability to respond to competitive forces is driven by IT

(Sher & Lee, 2004). Ravilla et al. (2011) argued that IT, as an enabler of knowledge management, plays a vital role in identifying, acquiring, storing, and disseminating knowledge, thereby facilitating ambidexterity. Scholars also have theorized that firms ought to not only exploit existing knowledge but also invest in continually exploring new knowledge to gain a sustainable competitive advantage (Sambamurthy & Subramani, 2005). Technology ambidexterity positively affects organizational agility and operational ambidexterity (Lee et al., 2015). Therefore, as startups seek rapid growth and gain competitive advantage, technology ambidexterity can be an important influential factor.

Theoretical Tenets of Ambidexterity

Lee et al. (2015) defined ambidexterity from a technology standpoint as a firm's ability to simultaneously pursue exploration and exploitation in the management of IT competencies. This ambidexterity metaphor has its origins in the human ability to use both hands with equal dexterity. Applied to organizations, it describes the capability of exploiting existing competencies and exploring new opportunities with equal dexterity (Lubatkin, 2006; Winter, 1971). In the seminal article on organizational learning, March (1991) expounded on the need for firms to balance exploitation of current certainties against exploration of future possibilities.

According to the ambidexterity theory propounded by Tushman and O'Reilly (1996), organizational ambidexterity is defined as the "ability to simultaneously pursue both incremental and discontinuous innovation and change from hosting multiple contradictory structures, processes, and cultures within the same firm" (p. 6). Exploitation and exploration encompass either incremental change or are punctuated by revolutionary change (Tushman & O'Reilly, 1996). While exploitation speaks to efficiency and execution, exploration speaks to flexibility and innovation (Turner & Lee-Kelly, 2013). Researchers also have noted that an exclusive focus on either exploitation or exploration of new opportunities can be detrimental to the firm, as the

firm can fall into a success trap (Reeves & Harnoss, 2015). Thus, the importance of ambidexterity is underscored by the quest for long-term organizational survival and competitive advantage, which demands organizational adaptability to environmental changes while simultaneously focusing on current execution and efficiency (O'Reilly & Tushman, 2008).

From a technology standpoint, this simultaneous pursuit is an imperative because technological capabilities and resources need to be continuously augmented to defend a firm's competitive position and to advance innovation (Porter, 1985; Teece et al., 1997; Wernerfelt, 1984). This is specifically true for entrepreneurial organizations, as they are characterized by risk taking, origination, and a forward-looking department with an audacious appetite for use of technology (Blanco et al., 2017; Covin & Slevin, 1991). As growth is propelled by novelty and distinctiveness (Hitt et al., 2001; Moriss et al., 2008), technology ambidexterity can have a positive impact on sales growth in startups (He & Wong, 2004).

Antecedents of Ambidexterity

Several research studies have looked at the antecedents of organizational ambidexterity from various theoretical perspectives. Gibson and Birkinshaw (2004) suggested a paradoxical approach (both/and) to identify the antecedents of ambidexterity, beyond structural tradeoffs (either exploitation or exploration); the authors argued that ambidexterity is achieved through a carefully selected, defined context of performance management, with specific individual behaviors conducive to both exploitation and exploration. Thus, according to Gibson and Birkinshaw (2004), the antecedent conditions for organizational ambidexterity are contextual (hence the moniker contextual ambidexterity) where the components can be classified under performance management and social context (Gibson & Birkinshaw, 2004). Co-opting this contextual ambidexterity view of Gibson and Birkinshaw (2004), Raisch and Birkinshaw (2009) proposed an integrated set of antecedents that include context (Gibson & Birkinshaw, 2004) and

structure (Tushman & O'Reilly, 1996), along with leadership antecedents; the theoretical rationale was that it takes senior management's involvement and leadership to affect an appropriate context and set up the right structure that smooths ambidexterity. Some of the key antecedents considered by prior organizational ambidexterity research are: performance management and social context (Gibson & Birkinshaw, 2004), structure, context, and leadership, (Raisch & Birkinshaw, 2008). Building on the organizational effectiveness framework of Ghoshal and Bartlett (1994), Gibson and Birkinshaw (2004) argued that organizational performance is achieved through a system of processes enveloped by an appropriate structure that jointly outlines a context conducive to alignment and adaptability (exploitation and exploration), ensuring business performance. Following an extensive review of ambidexterity literature, Raisch and Bartlett (2008) proposed a framework for understanding ambidexterity in which structure, context, and leadership were theorized as antecedents of ambidexterity. The synthesis of nearly two decades of research on ambidexterity has brought together concepts of organizational learning (March, 1991; Levinthal & March, 1993), organizational structure (Tushman & O'Reilly, 1996), organizational leadership (Lubatkin et al. 2006; Smith & Tushman, 2005), organizational context (Gibson & Birkinshaw, 2004), and organizational performance (Jansen et al., 2006). Raisch and Bartlett (2008) posited that ambidexterity becomes a dynamic capability when organizations evolve over time to reconfigure their organizational activities to align and adapt to changing environmental conditions.

Scholars also have theorized that organizational ambidexterity and its antecedents can be viewed as a dynamic capability (O'Reilly & Tushman, 2008; Teece et al., 2007), as firms need to balance existing customer satisfaction on the one hand (exploitation) while shaping the future on the other (exploration; Schreuders & Legesse, 2012). Ambidexterity can correlate with contradictory outcomes, since exploitation concerns efficiency and convergent thinking, while

exploration is about experimentation and divergent thinking (O'Reilly & Tushman, 2008). Smith and Tushman (2005) viewed ambidexterity as a paradox and stated that an effective embrace of the contradictions is better than avoiding the contradictions altogether (Smith & Lewis, 2011). In this regard, from a technology standpoint the dynamic capabilities perspective has been utilized to study technology-oriented antecedents of ambidexterity. I provide a brief illustration of these key factors in the following paragraphs.

Antecedents from Dynamic Capabilities Perspective

Information Technology, along with complimentary assets, is often viewed as a core component of a company's toolkit to distinguish itself in the marketplace and to obtain a competitive advantage (Mata et al., 1995; Powell & Dent-Micallef, 1997). Zahra et al. (2006) argued that successful entrepreneurships, continuously create, discover and exploit entrepreneurial opportunities and can develop and apply dynamic capabilities. While Zahra et al. (2006) defined dynamic capabilities as the ability to reconfigure a firm's resources and routines in a manner deemed appropriate by its principal decision-makers, Pavlou and El Sawy (2006) took a slightly broader view describing dynamic capabilities as the ability to integrate, build, and reconfigure internal external competencies to address rapidly changing environments.

In the IT literature, scholars have examined dynamic capability's role in impacting a firm's competitive advantage (Sambamurthy et al., 2003; Wang et al., 2013; Zahra & George, 2002a). Central to this rationale is that IT provides dynamism and agility to a firm through organizational capabilities and strategic processes (Sambamurthy et al., 2003). Whereas dynamism is reflective of a firm's ability to integrate, build, and reconfigure internal and external proficiencies, agility is reflective of the firm's ability to sense environmental change and rapidly respond (Overby et al., 2006).

In this regard, Pavlou and El Sawy (2006) provided an empirically validated framework for studying technology antecedents in product innovations; their framework posited that there are four enabling processes—market orientation, absorptive capacity, coordination capability, and collective mind—that drive new product development (NPD) dynamic capability. They theorized that these four enabling processes map to the theoretical tenets of sensing, learning, coordinating, and integrating interaction patterns that enable a firm to drive innovation (Pavlou & El Sawy, 2006).

These enabling processes also find broad support in prior ambidexterity literature. For instance, an organization's deployment of technology for exploitative and explorative purposes can be discerned through its vision—reflecting a clear expression of the firm's strategies to its stakeholders (Caudemiz & Zalluhoglu, 2013). This organizing vision facilitates three important aspects of innovation: interpretation, legitimization, and mobilization. Shared vision moves the organization towards a collective goal, inspiring and motivating employees (Madu, 2013; Tsai & Ghoshal, 1996). Strategic thinking from the perspective of technology can also play a significant role in enabling ambidexterity in a firm. Strategic thinking is characterized by the startup's competitive aggressiveness to formulate new products or services, enhance new product or service returns, and raise the level of proactiveness (exploration). According to Daft (2013), strategy provides a broad blueprint to delineate technology resource allocation and undertakings for achieving the organization's goals. Strategic thinking will further sharpen the focus to employ new technology to gain a competitive advantage through constructing the organization's capacity to build, integrate, and reconfigure internal resources (Sambamurthy, Bharadwaj, & Grover, 2003).

Finally, Morgan and Berthon, (2008) empirically established the link between market orientation and organizational ambidexterity. Market orientation is a composite of holistic

generation of market intelligence, an organization-wide propagation of that intelligence, and the organization-wide sensitivity to the intelligence with the objective of doing something about it (Kohli & Jaworski, 1990). Atuahene-Gima (1996) reported a significant and positive association of market orientation with innovation. The bifurcated view of market orientation—responsive market orientation where a firm seeks to satisfy customers’ needs (exploitation) and proactive market orientation where a firm seeks to meet customers’ latent needs (explorative)—may point a firm towards ambidexterity (Sanal et al., 2013). Furthermore, studies have shown that market orientation enables innovations that utilize technology (Zhou, Yim, & Tse, 2005). Sanal et al. (2013) asserted that market orientation may be viewed as an organizational culture to comprehend and propagate market knowledge, an exceptional driver of ambidexterity.

Summary of Literature Review

The difference between exploitation and exploration has been articulated as old certitudes and adeptness and new potentials for discovery. The former informs manipulation of existing strengths, competencies, and assets; the latter, new possibilities and innovation. There is a need for organizations to simultaneously engage in both exploitation and exploration of technology. This is an imperative for startups as new entrants will use technology to create a competitive advantage for themselves. Based on extant IT and management literature, several antecedents can potentially impact ambidexterity considerations in startups. However, prior research has not delved into developing the construct of technology ambidexterity, its antecedents, or its consequences as they apply to startups. Hence, the focus of this essay is on elucidating technology ambidexterity, its antecedents, and the effects of technology ambidexterity on startup success.

Research Model and Hypotheses Development

The research model for this study is shown in Figure 1. I employed ambidexterity theory

developed by Tushman and O'Reilly (1996) as the overarching theoretical foundation in this study. Further, I subscribed to the dynamic capabilities perspective (Bharadwaj, 2000; Powell & Dent-Metcalf, 2003; Sambamurthy et al., 2003; Teece et al., 1997) and defined technology ambidexterity as the firm's ability to simultaneously pursue exploration and exploitation in the management and use of IT competencies.

Additionally, I adapted the new product development dynamic capabilities paradigm (Pavlou & El Sawy, 2006) to hypothesize on the antecedents to technology ambidexterity. By their very nature, startups are primarily about creation of new products and services (Moroni et al., 2015; Ries, 2011) and innovation, and therefore adapting this framework to the startup context was appropriate. Further, the four enabling processes have found extensive support in the general management and IT literature examining firm-level dynamic capabilities, in various contexts (Ambrosini et al., 2009; Bhatt & Grover, 2005; Kim & Lee, 2006; Pavlou & El Sawy, 2006; Sher & Lee, 2004; Teece et al., 1997). Therefore, based on these theoretical foundations, technology ambidexterity was postulated to have a positive impact on startup success. Shared vision, IT strategic thinking, market orientation, and technology absorptive capacity were theorized to have a direct positive impact on technology ambidexterity.

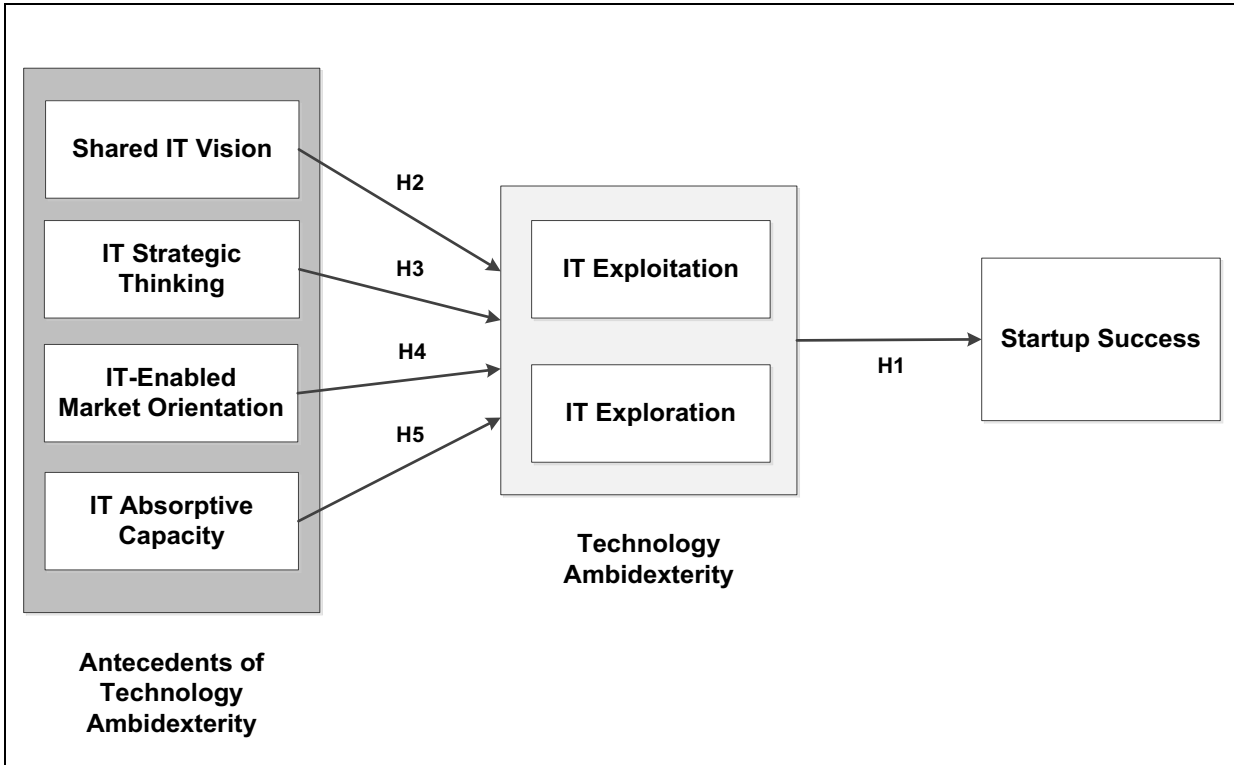


Figure 3.1. Research model and hypotheses.
Note: IT refers to Information Technology

In the following sections, I expand on each of these constructs and build the theoretical rationale for each of these hypotheses.

Impacts of Technology Ambidexterity

Based on the theory of ambidexterity developed by several researchers (Gibson & Birkinshaw, 2004; He & Wong, 2004; Tushman & O'Reilly, 2009), I defined technology ambidexterity as an organization's ability to balance exploitation of current technology while simultaneously exploring new technology. Technology exploitation relates to a firm continuing within a prevailing technological course that utilizes existing technical skills and capabilities. By the same token, technology exploration involves a movement away from a firm's current technical knowledge base and skills (Lavie et al. 2010; Danneels 2002).

The dynamic capabilities perspective posits that firms which have the capability to simultaneously explore and exploit technology would attain superior outcomes (Lee et al., 2015). This dynamic capability can render a firm with the ability to automate and informate simultaneously, which can subsequently lead to superior functional and firm-level performance (Subramani 2004). According to Schreuders and Legesse (2012), early in a startup's maturation most of the firm's resources are devoted to design and development of its first product(s). Establishment of an initial customer base is rapidly followed by a need to shift focus towards exploring new technologies, product development, and innovation in general. A startup that is flexible in the use of its resources—shifting from satisfying current customers to exploring new avenues—creates a competitive advantage for itself and has more chances of survival (Schreuders & Legesse, 2012). In other words, exploration and exploitation of technology can function as complementary capabilities, generating greater rents for the startup (Dyer & Singh, 1998; Lee et al., 2015).

For example, IRI was known as a data and analysis provider in the consumer-packaged goods industry. For a long time, IRI focused on maintaining the current product suite when the industry had already been providing next generation analytics. Customers, while satisfied with IRI's current product, were left unhappy with IRI's lack of next generation analytics. Growth was stunted, and the company was not looked at favorably by the market until it started devoting resources to exploring next generation products. Once customers were convinced IRI was back on the exploration path, sales grew, and eventually the company was successfully bought out.

Firms need to accommodate both exploitation and exploration of technology to be successful (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013). The criticality of balancing the two is underscored by historical examples of overreliance on the one to the detriment of the other, with disastrous consequences (Tushman & O'Reilly, 1996; Vorbach et al., 2016). For instance, firms that focus entirely on exploiting current technologies (to bring about efficiencies) become complacent while the rest of the industry has moved on to exploring more effective technologies (Phillips, 2017). Therefore, from a dynamic capabilities' standpoint, exploiting current technology has a significant positive impact on efficiency, lowering the cost of operations. On a parallel note, exploring new technologies may give the startup the ability to jump ahead of competition. However, focusing on one to the exclusion of the other would not lead to favorable outcomes. This means that firms with higher levels of technology ambidexterity will outperform those with lower levels of technology ambidexterity. Hence, I postulated that:

H₁: Technology ambidexterity will have a positive impact on startup success.

Antecedents of Technological Ambidexterity

In this section, I expand on the impacts of the antecedents of technology ambidexterity,

namely shared IT vision, IT strategic thinking, IT-enabled market orientation, and IT absorptive capacity.

Shared information technology vision. Tsai and Ghoshal (1998) stated that shared vision represents the collective goals and desires of the members of an organization. A startup firm's shared vision speaks to its core ideology and directs the company's purpose towards its customers' success (Collins & Porras, 1996), rather than being product or service centric, and can be the basis for a common incentive system that is anchored on the overall success of the firm (O'Reilly & Tushman, 1997)

Madu (2013) conceptualized shared vision as something that brings the future forward to today, is collectively owned by everyone in the organization, and is rousing and motivational. Adapting this conceptualization to the IT domain, I defined IT shared vision as the coalescing of motivational ideas about IT among the employees of the startup. Information Technology being a shared resource, this leads to a better understanding between individuals in the organization, particularly about the potential value of their shared resources. Organizationally, this social dimension brings about a level of shared understanding of and obligation to, the business its information technology mission, goals and plan (Reich, 1996). The social dimension that Pavlou and El Sawy (2006) termed *collective mind* assists in the management of dependencies among resources.

Shared IT vision can have a positive impact on technology ambidexterity. A startup's core purpose is to bring novelty to the market, and IT plays a vital role in promoting an innovation mindset in a startup (Viki, 2017). Integrating views from various parts of the organization brings about an aggregation of mental processes (Grant, 1996; Weick & Roberts, 1993) and enhances the learning process through social cognition (Akgün et al., 2003).

Aggregation of mental processes can potentially lead an organization to make “full use of information technology in support of, or as a catalyst for, business strategy” (Reich, 1996, p. 57). It helps to raise awareness about the future potential of IT, the rapid changes in IT, and the need to keep investing in emerging technologies. This serves to build consensus and commitment among the staff and top management of the startup for investing in ambidextrous use of technology. Thus, as the employees of the startup coalesce around the benefits of utilizing the technology, they are more likely to exploit and explore technology. In other words, startups with higher levels of shared IT vision will be more technologically ambidextrous compared to startups with lower levels of shared IT vision.

Hence, I postulated that:

H₂: Shared IT vision will have a positive impact on startup technology ambidexterity.

Information technology strategic thinking. Borrowing from Zahra and Nambisan (2012), IT strategic thinking can be defined as a thought process that entails building and considering different IT scenarios representing the collection of various forces that together help predict the future. Following Chen et al., (2010), IT strategic thinking can be viewed as the strategic imperative of the top management of an organization on the use of IT to seek innovation. Several researchers have underscored the importance of IT strategic thinking (Mithas & Rust 2016), as the next stage of strategy evolution is expected to shift from business strategy to IT strategizing (Galliers, 2016).

Information Technology strategic thinking broadens the potential of IT to develop new capabilities and can have a positive impact on technology ambidexterity (Day, 1994). Startups that invest in strategic thinking about IT tend to develop keener insights on the utility and value proposition of existing technology in their businesses (Leidner et al., 2011). These firms

position themselves to envision changes to the current business landscape and accumulate significant knowledge about new and emergent technologies (Galliers, 2016). For instance, Krishnakanthan et al. (2017) stated that a firm's IT strategy includes a systematic building of new capabilities as one of the essential components.

Therefore, as startups gain knowledge about new technology, they also become more familiar with the utility (and potentially disruptive nature) of the technology in their businesses. As startups operate in a hyper-competitive environment (Kim & Kogut, 1996), this can act as an impetus for these firms to exploit such new technology as a means to get ahead of competition. In other words, startups with higher levels of IT strategic thinking are expected to be more technologically ambidextrous than startups with lower levels of IT strategic thinking. Hence, I postulated that:

H₃: Information Technology (IT) strategic thinking will have a positive impact on startup technology ambidexterity.

Information technology enabled market orientation. Technology-enabled market orientation refers to the use of IT to obtain customer preferences and respond to market needs. Recent advances in IT have provided startups with sophisticated business intelligence (BI) tools, data warehouses, and business analytics capabilities to engage with the customer and to acquire and analyze customer data efficiently (Bijmolt et al., 2010; Jayachandran et al., 2005). This can enable startups to respond quickly to changing market conditions. Sophisticated technologies suggest a rich message can potentially be rapidly delivered to a larger customer audience, customer responses can be analyzed, and customer requirements fulfilled (Peppard, 2000).

Market orientation is outlined as the extent to which a firm is focused on obtaining customer preferences and responding to market needs. It is defined as the organization-wide

generation of market intelligence pertaining to current and future needs, dissemination of the intelligence across departments, and organization-wide responsiveness to it (Kohli & Jaworski, 1990). Market orientation drives firm innovative behavior as it involves responses to market conditions through novel and innovative products or services through customer-led or customer-compelled activities (Kohli & Jaworski, 1990; Narver et al., 2004). Thus, market orientation is useful in generating, disseminating, and responding to market needs (Pavlou & El Sway, 2006).

Given the hypercompetitive environment that startups operate in, obtaining customer preferences and responding to market needs requires sophisticated use of IT (Agarwal, 2015). For example, in the quest to understand the customer (customer-led), huge data warehouses have been deployed to gain market intelligence. However, traditional methods of acquiring customer information may be too unwieldy and expensive. Technologies such as mobile and cloud computing are also significantly changing customer expectations about what constitutes convenient, high quality service (Reimer et al., 2017).

Information Technology (IT)-enabled market orientation can have a positive impact on a startup's technology ambidexterity. First, technology-enabled market orientation exposes a startup to the power of Business Intelligence (BI) and analytics capabilities to target the right customer base (Bernstein et al., 2011; Grabova et al., 2010). For example, BI as a software service (BIaaS) provides a startup with much needed customer metrics and preferences while keeping the costs low, boosting the startup's efforts to continue exploiting the technology (Baars & Kemper, 2010; Bharadwaj et al., 2013). Second, customer engagement with traditional technology is on the decline and newer forms of customer engagement may be needed from time to time (Bharadwaj et al., 2013). For example, while Facebook is still the leading advertising platform, recent trends have indicated that customers are switching to platforms such as Twitter, Instagram, and so forth, with increasing focus on gamification channels (Atieno, 2015).

Consequently, as customers engage more on various social media, digital assets, and gamification, it becomes imperative for startups to explore new and emergent technologies to better engage with customers and understand their needs (Ashley & Tuten, 2015; Hamari et al., 2014). Startups that are attuned to market needs tend to use advanced technology to benefit customers (Zhou et al., 2005), as they strive for global reach of customers, personalization of the services, and faster product delivery (Borges et al., 2009; Wang et al., 2013). The implication is that startups with higher levels of IT-enabled market orientation are expected to be more technologically ambidextrous than startups with lower levels of technology-enabled market orientation.

Hence, I postulated that:

H₄: Information Technology (IT)-enabled market orientation will have a positive impact on startup technology ambidexterity.

Information technology absorptive capacity. The absorptive capacity of IT is the organization's facility to identify, integrate, and manipulate IT to achieve organizational goals (Cohen & Levinthal, 1994). García-Morales et al. (2007) defined technology absorptive capacity as the acquisition of technology stock, assimilation, and transformation of the firm. Transformation in such firms is evidenced by the ability to develop and refine firm practices, to enable combining the acquired technology with existing technology, and to assimilate and exploit technical knowledge (García-Morales et al., 2007).

Pavlou and El Sawy (2006) argued that while absorptive capacity is beneficial to generate new knowledge, technical competence helps in product development. Extending the logic to IT absorptive capacity, IT Absorptive Capacity can have a positive impact on technology ambidexterity in startups. From an organizational perspective, absorptive capacity has been

shown to have a positive impact on performance (Klinger, 2016; Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011). Raisch et al. (2009) argued that an organization's ability to harness the benefits of ambidexterity depends on the organization's absorptive capacity. Rothaermel and Alexandre (2009), testing their hypothesis on a multi-industry sample of U.S. manufacturing companies, posited that a firm's absorptive capacity is strongly associated with its ability to be ambidextrous.

From a technology standpoint, entrepreneurial success, and by extension startup success, is increasingly tied to the startup's ability to respond to opportunities that are often technological in nature (Almeida et al., 2003). However, to fully explore and exploit this knowledge, startups, as small, entrepreneurial firms, require the capability to acquire, assimilate, and transform the knowledge (Gray, 2006). Startups with higher technology absorptive capacity are better able to appreciate and thus obtain value from complex external technical knowledge and resources (Winklebach & Walter, 2015). While technology ambidexterity pits two contradictory forces against each other—exploitation of current technology competencies versus exploration of new technologies—and is hard to achieve, a firm's absorptive capacity enables more successful realization of ambidexterity (Rothaermel & Alexandre, 2009) through exposure to new and emergent opportunities (Winklebach & Walter, 2015). It follows then that the higher the startup's technology absorptive capacity, the greater its impact on the startup's technology ambidexterity. Hence, I postulated that:

H₅: The absorptive capacity of IT will have a positive impact on startup technology ambidexterity.

Methods

Sample Design and Procedures

This study aimed to test rather than build the proposed governance model (Tatli, Vassilopoulou, Özbilgin, Forson, & Slutskaia, 2014), leading to a positivist methodological approach of the study. The target population consisted of startup firms that have been established for at least two years. Target respondents were startup founders or any leader that could represent the firm and respond to business as well as technology questions.

Qualtrics was engaged to administer the survey and distributed the survey link at random to a list of individuals who qualified to take the survey; to qualify, respondents had to be 18 years or older and able to answer the survey questions with complete knowledge. All respondents who successfully completed the survey (if not deleted in the survey response review process) were offered financial incentive for their participation. The key informants (founders, Chief Executive Officers, Chief Technology Officers, etc.) who were best suited to answer the questions from the startup participated in the survey.

The data collected through Qualtrics was analyzed using SmartPLS 3.0. Chin (1998) elucidated the versatility of Partial Least Squares (PLS) method noting that although PLS can be used for theory confirmation, it can also be used to suggest where relationships might or might not exist. Chin (1998) maintained that PLS is more appropriate for a large percentage of studies. Hair et al. (2011, p. 2) maintained that a PLS approach “can indeed be a silver bullet for estimating causal models in many theoretical model and empirical data situations.” Smart PLS was utilized to conduct the analysis of measurement and structural models, with validation using established standards for reliability and validity (Cronbach, 1978; Fornell & Larcker 1981; Gefen & Straub, 2005; Nunnally, 1979;). According to Chin et al. (2003), a minimum sample size of 10 times the number of maximum incoming arrows into a construct is required to yield

reasonably consistent results. I obtained 220 completed responses, above the threshold sample required for analysis.

Scale Development and Measures

Scale development and measures were based on prior research and modified appropriately (Flatten et al., 2011; He & Wong, 2004). The measures were appropriately modified following the expert review and the pilot test. A panel of five experts drawn from both the academic and startup practicing community took an initial look at the survey measures. The survey was modified and tested on a pilot basis with 15 startups. The feedback provided regarding appropriateness of questions, clarity, and time required were taken into account before the final survey was launched with Qualtrics.

Dependent variable: Startup success. The dependent variable in this study was startup success measured as year over year growth. To the extent that startup firms have a very low survival rate (26%) at the end of five years (Mason, 2017), startup success can be expressed in several ways: year over year sales growth, return on investment, 5–10-year survival, and so forth (Walter, Parboteeah, Riesenhuber, & Hoegl, 2011). In the present study, following Walter et al. (2011), startup success was defined as year over year sales growth—a representation of the extent to which customers value a startup firm’s products or services. However, startup success can also be defined in terms of number of patents filed or the number of new products or services introduced (Farre-Mensa, Hegde, & Ljungqvist, 2017). As stated previously, the startup failure rate is high. Consequently, year over year growth is a good measure of survivability and customer buy-in. I therefore adopted year over year sales growth as the measure for this construct. In addition, I also measured total sales over five years and years of operation over five years. I also adapted organizational outcomes to the startup context and developed reflective items of startup success, in addition to these quantitative measures.

Technology ambidexterity. The emphasis in this study was on technology exploitation and exploration. Consequently, the items were designed to gather information regarding the firm's penchant for balancing old technology certitudes (exploitation) and drive towards new technology horizons (exploration). He and Wong (2004) found evidence consistent with the hypothesis that ambidexterity positively influences firm performance and showed the joint influence of exploration and exploitation on sales growth; the authors proposed an 8-item scale but suggested future research should examine additional measures. Taking a slightly different approach, Tuan (2016) used six items to depict exploratory orientation and six items for exploitative orientation and calculated ambidexterity as the sum of all items. The rationale was that the additive model is superior to the multiplicative model due to no significant loss of information (Tuan, 2016). Jansen et al. (2009) measured ambidexterity by taking the additive approach and demonstrated it to be superior to the multiplicative and subtraction models. Cao et al. (2009) measured the combined effect of exploration and exploitation by mean centering the exploration and exploitation scales before obtaining the product of the two terms. Chandrasekaran et al. (2012) looked at competence as a measure of ambidexterity. While competence is a good proxy, my intent was to measure the firm's proclivity for new and old technology and the attempt to balance the two.

Lubatkin et al. (2011) focused their study on small to medium size companies and proposed a 12-item measure based on He and Wong (2004); the measure was a product of expert review. The measure is additive of the two separate measures for exploration and exploitation. The authors analytically showed the additive model to be far superior to the multiplicative model. Consequently, I adopted the Lubatkin, et al. (2011) items for this construct and appropriately modified them.

Shared information technology vision. According to Nautin (2014), a business vision

must balance multiple dimensions to be effective—broad enough to be recognized by a large environment yet specific enough to differentiate the firm and serve the firm over the long term and articulate ideals of how progress is going to be achieved. A business vision is a shared view (amongst the employees of the firm) of what the firm stands for. When Allan Mullaly, dubbed one of the World's Best CEOs by Forbes Magazine (Reynolds, 2014), first came to Ford from Boeing Corporation, he got together the brightest employees and had them work on a vision for the company; the team decided every new Ford was going to be the best in its class (Guuzetta, 2017).

Tsai and Ghoshal (1998) used a 2-item measure to assess the level of shared vision amongst different business units. The 5-item scale proposed in this study attempted to capture the essence of a technology shared vision in keeping with Nautin (2014), balance dimensions, and the aggregate mental processes notion of Weick and Roberts (1993).

Information technology strategic thinking. Henderson and Venkatraman (1993) argued that a firm's IT strategy should be expressed in dual terms—internal and external. The best description of IT is as a general-purpose technology because of its broad impact (Brynjolfsson & Hitt, 2000). Powell and Micalleff (1997) gave many examples of how IT positively contributes to competitive advantage and firm performance. Thus, IT's role in both exploitation and exploration is well established in practice.

The scale items in this study sought to capture the centrality of the role of IT. There were four items that measured IT strategic thinking, seeking to capture data regarding IT's contribution to business value, integration of strategic planning with IT planning activities, overall comprehension of IT investments in the startup's business, and application of IT in the business.

Information technology-enabled market orientation. Kohli and Jaworski (1990) referred to market orientation as the firm wide generation, dissemination, and responsiveness to market intelligence. Building on Kohli and Jaworski (1990), Jaworski et al. (1993) took a similar view of market orientation as the firm-wide generation and dissemination of market intelligence pertaining to current and future needs of customers and the firm's responsiveness to it; the authors proposed a detailed 32-item scale to measure market orientation, of which 10 pertained to market intelligence, eight to intelligence dissemination, and 14 to responsiveness. The context for the study by Jaworski et al. (1993) was a large business or unit. However, recent works also have sought to reduce the complexity of the scale and utilized a smaller set of items for measuring market orientation (Pavlou & El-Sawy, 2008). Therefore, to reduce survey complexity and with the goal of assembling a smaller set of items, I used a 6-item scale to measure environmental scanning (market intelligence), market responsiveness, and the startup products' relevance to customer needs.

Information technology absorptive capacity. Following Cohen and Levinthal (1990), technology absorptive capacity can be defined as a firm's ability to acquire, assimilate, and apply new technology. According to Lin et al. (2002), a firm's technology absorptive capacity encompasses organizational culture, interaction mechanisms, investments, and technology diffusion mechanisms. Flatten et al. (2011), in their study of absorptive capacity and firm performance in small and medium size firms, proposed a multidimensional scale to measure absorptive capacity. The present study adopted the theoretical tenets of Pavlou and El Sawy (2006). Consequently, the items were a modified version of both Flatten et al. (2011) and Pavlou and El Sawy (2006) and reflected the four dimensions of acquisition, assimilation, transformation, and application of new technology.

Control variables. Based on prior research (He & Wong, 2014; Rothaermel &

Alexandre, 2009), the following control variables were included: size of firm, age of firm, and industry the firm belongs to. Accordingly, data on size of the firm (number of employees), the number of years the firm has been in business, and industry type were collected. Additionally, I also controlled for the level of technology in which the startup is involved.

Analysis and Results

This section encompasses the research data collected and used, along with the measurement and structural models developed. As indicated previously, SmartPLS 3 was utilized for the analysis. The scope of the analysis included the assessment of measurement model in terms of reliability, construct, and discriminant validity, followed by an evaluation of the structural model, wherein the hypotheses were tested.

Measurement Model

To validate the measurement model, the approach recommended by Gefen and Straub (2005) was followed. The analysis indicated that kurtosis and skewness were within range of normality.

Two important decisions were made regarding constructs in the model. First, to compute technology ambidexterity, the product indicant approach was utilized. I computed the standardized product indicant scores of the items from IT explore and IT exploit to get the items for technology ambidexterity. This was consistent with the theorization in this study, which stated that technology ambidexterity is a combination of both IT explore and IT exploit.

Second, while analyzing the validity estimates, it was determined that IT absorptive capacity had a lot of overlap with other constructs. I checked the correlations and verified the item-to-construct correlation values. Since the construct did not seem to discriminate well from other constructs, the construct of IT absorptive capacity was dropped from the hypothesis testing.

Therefore, the final tested model did not consider testing for H_5 .

Table 3.1 shows Cronbach's alpha and internal consistency reliability values were greater than 0.7, thus establishing construct reliability. Following Gefen and Straub (2005) and Kock (2015), the criteria to determine discriminant validity, namely item-to-construct correlations, ought to be greater than the envisioned construct and the Average Variance Extracted values need to be greater than 0.5.

Table 3.1 Construct Reliability and Average Variance Extracted

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
IT Exploit	0.939	0.955	0.956	0.845
IT Explore	0.935	0.937	0.954	0.837
IT-enabled Market Orientation	0.954	0.954	0.963	0.813
IT Strategic Thinking	0.921	0.923	0.944	0.807
Shared IT Vision	0.922	0.926	0.945	0.810
Startup Success	0.933	0.947	0.949	0.788

Note: IT refers to Information Technology

Table 3.2 Outer Model Loadings with t-Statistics

Construct	Item	Question	t-Statistic
Information Technology (IT) Explore	ITExplore_1	We base our success on our ability to explore new IT solutions.	52.568
	ITExplore_2	We are always on the lookout for new ways to satisfy customer needs through customer satisfaction.	72.939
	ITExplore_3	We are able to enter new market segments by utilizing new IT solutions.	55.387
	ITExplore_4	We use IT to actively seek new customer segments.	39.923
	IT Explore_5	We use IT to actively seek new customer segments.	50.036
IT Exploit	IT Exploit_1	We use IT in most of our business operations.	33.711
	ITExploit_2	We use IT to fine tune our products/services to satisfy our customers	71.139
	ITExploit_3	We use IT to broaden our offerings to more customers.	67.748
	ITExploit_4	We are committed to using IT to improve quality and lower costs.	62.866
Shared IT Vision	ITVision_1	Our startup has a clear IT vision.	50.146
	ITVision_2	Our startup's perspective of IT has been discussed among our employees.	33.253
	ITVision_3	Our startup's perspective of IT helps us see the possibilities of utilizing IT for innovation.	51.708
	ITVision_4	Our startup's perspective of IT helps us determine the limits of IT.	81.415
IT Strategic Thinking	ITST_1	Our startup has a clear idea regarding how IT contributes to business value.	50.073
	ITST_2	Our startup integrates business strategic planning and IT planning activities.	46.660
	ITST_3	We clearly understand the value of IT investments in our business.	44.898
	ITST_4	Our startup has a clear idea regarding the application of IT in our business.	36.667
IT-enabled Market Orientation	ITMO_1	Our startup is in tune with the market when it comes to deploying new IT solutions.	59.533
Construct	Item	Question	t-Statistic

	ITMO_2	We continuously scan the environment for new IT solutions.	63.300
	ITMO_3	Our startup is usually the first in the market to implement new IT solutions.	58.403
	ITMO_4	Our startup periodically reviews IT use in product development to make sure it is in line with customer needs.	70.031
	ITMO_5	Our customers welcome our deployment of IT solutions.	62.866
	ITMO_6	Our industry is driven by IT.	48.498
Startup Success	Success_1	Our sales have grown in the last five years.	54.840
	Success_2	Our customers have enthusiastically accepted our products/services.	21.866
	Success_3	We have been able to regularly add customers.	39.690
	Success_4	Our customer list has grown in the last five years.	67.220
	Success_5	Our year over year sales growth is positive.	58.922

Note: IT refers to Information Technology

ITExplore_1 – ITExplore_4 – Items for IT Explore

ITExploit_1 – ITExploit_4 – Items for IT Exploit

ITVision_1 – ITVision_4 – Items for IT Vision

ITST_1 – ITST_4 – Items for Shared IT Vision

ITMO_1 – ITMO_4 – Items for IT-enabled Market Orientation

Success_1 – Success_5 – Startup Success

Loadings from the outer model for items had t -values greater than 1.96, confirming convergent validity (Table 3.2). Additionally, item-to-construct correlations for the construct were greater than the rest of the correlations (Table 3.3), and the square root of the AVE was greater than the other correlations (Table 3.4), indicating discriminant validity.

Table 3.3 Item-to-Construct Correlations

Items	IT Exploit	IT Explore	IT-enabled Market Orient	IT Strategic Thinking	Shared IT Vision	Startup Success
ITExploit_1	0.881	0.707	0.706	0.733	0.733	0.229
ITExploit_2	0.935	0.792	0.759	0.737	0.759	0.221
ITExploit_3	0.932	0.804	0.765	0.77	0.777	0.302
ITExploit_4	0.927	0.756	0.75	0.765	0.789	0.284
ITExplore_1	0.776	0.905	0.776	0.657	0.722	0.325
ITExplore_2	0.758	0.924	0.725	0.662	0.703	0.301
ITExplore_3	0.788	0.930	0.779	0.64	0.722	0.296
ITExplore_4	0.729	0.900	0.728	0.627	0.67	0.339
ITExplore_5	0.788	0.93	0.779	0.640	0.722	0.296
ITMO1	0.741	0.738	0.907	0.777	0.81	0.362
ITMO_2	0.734	0.748	0.917	0.774	0.803	0.377
ITMO_3	0.68	0.738	0.889	0.633	0.715	0.312
ITMO_4	0.765	0.738	0.918	0.777	0.799	0.362
ITMO_5	0.771	0.749	0.905	0.75	0.797	0.334
ITMO_6	0.694	0.738	0.874	0.676	0.715	0.258
ITST_1	0.72	0.611	0.681	0.9	0.746	0.323
ITST_2	0.781	0.736	0.788	0.893	0.862	0.351
ITST_3	0.741	0.601	0.711	0.909	0.745	0.337
ITST_4	0.693	0.581	0.732	0.892	0.726	0.319
ITVision_1	0.747	0.721	0.818	0.795	0.891	0.308
ITVision_2	0.665	0.605	0.681	0.736	0.872	0.281
ITVision_3	0.797	0.699	0.771	0.8	0.909	0.275
ITVision_4	0.782	0.737	0.811	0.764	0.929	0.337
Success_1	0.308	0.35	0.383	0.335	0.311	0.889
Success_2	0.117	0.145	0.143	0.232	0.178	0.813
Success_3	0.23	0.302	0.291	0.324	0.279	0.900
Success_4	0.286	0.367	0.411	0.367	0.356	0.916
Success_5	0.288	0.318	0.359	0.362	0.322	0.916

Note: IT refers to Information Technology

ITExplore_1 – ITExplore_4 – Items for IT Explore

ITExploit_1 – ITExploit_4 – Items for IT Exploit

ITVision_1 – ITVision_4 – Items for IT Vision

ITST_1 – ITST_4 – Items for Shared IT Vision

ITMO_1 – ITMO_4 – Items for IT-enabled Market Orientation

Success_1 – Success_5 – Startup Success

Table 3.4 Measurement Model Validation

Constructs	IT Exploit	IT Explore	IT Market Orientation	IT Strategic Thinking	Shared IT Vision	Startup Success
IT Exploit	0.919					
IT Explore	0.834	0.915				
IT-enabled Market Orientation	0.811	0.823	0.902			
IT Strategic Thinking	0.818	0.707	0.812	0.899		
Shared IT Vision	0.833	0.77	0.858	0.860	0.900	
Startup Success	0.287	0.346	0.371	0.371	0.334	0.888

Note: Diagonal values represent Average Variance Extracted, IT refers to Information Technology

Structural Model

The final model testing the hypothesized model, including the control variables, is shown in Figure 2. The results of the hypotheses testing were as follows.

H_1 stated that technology ambidexterity will have a positive impact on startup success. Results showed that technology ambidexterity had a positive impact on startup success ($\beta = .763$; $t = 2.23$). Therefore, H_1 was supported.

H_2 stated that shared IT vision will have a positive impact on startup technology ambidexterity. Results showed that H_2 was supported ($\beta = 0.207$; $t = 1.997$).

H_3 stated that IT strategic thinking will have a positive impact on technology ambidexterity. Results showed that H_3 was supported ($\beta = 0.168$; $t = 2.446$).

H_4 stated that IT market orientation will have a positive impact on technology ambidexterity. Results showed that H_4 was supported ($\beta = 0.553$; $t = 6.69$).

Among the control variables, only firm size ($\beta = 0.19$; $t = 3.797$) had a significant impact on startup success. The impacts of age of startup ($\beta = -0.69$; $t = 1.126$), type of industry ($\beta = -0.023$; $t = 0.344$), and level of technology ($\beta = 0.0$; $t = 0.01$) on startup success were found to be insignificant. The main effects of IT explore ($\beta = -0.328$; $t = 0.717$) and IT exploit ($\beta = -0.328$; $t = 1.704$) were insignificant.

Overall, the model had an R^2 of 0.767 for technology ambidexterity and 0.194 for startup success.

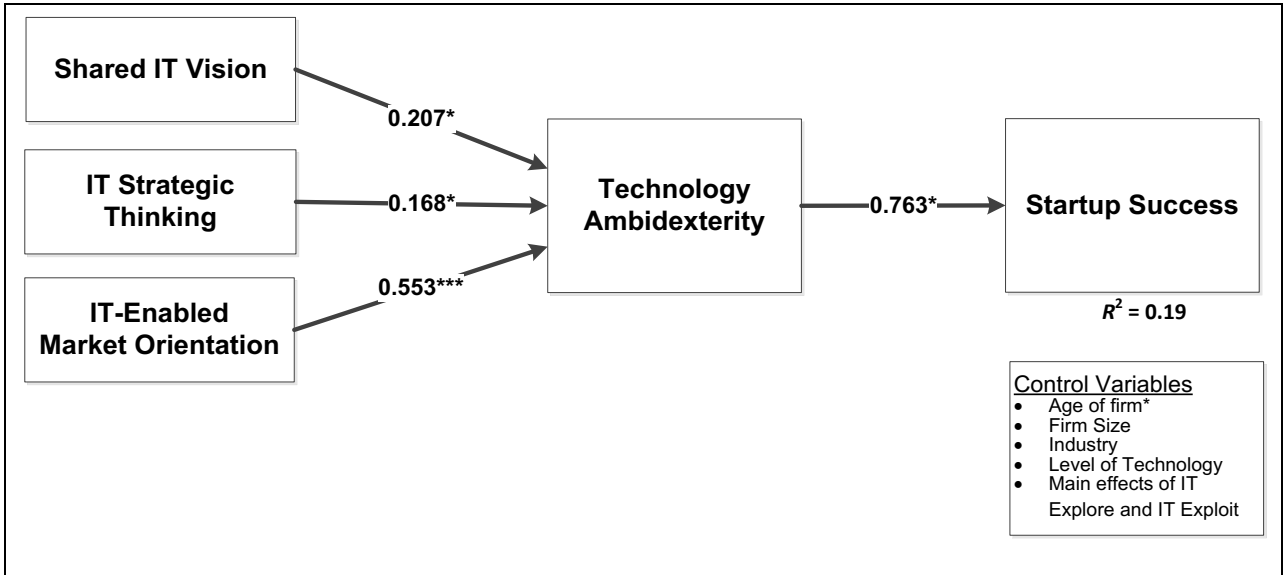


Figure 3.2 Antecedents and consequences of Technology Ambidexterity

Note: $*p < 0.05$, $**p < 0.01$, $***p < 0.001$; IT refers to Information Technology; Supported hypotheses are represented using bold lines.

Table 3.5 List of Hypotheses

Hypotheses	β , t -values	Supported/ Not Supported
H_1 : Technology ambidexterity will have a positive impact on startup success	$\beta = 0.763^*$ $t = 2.23$	Supported
H_2 : Shared IT vision will have a positive impact on startup technology ambidexterity	$\beta = 0.207^*$ $t = 1.993$	Supported
H_3 : IT strategic thinking will have a positive impact on startup technology ambidexterity	$\beta = 0.168^*$ $t = 2.446$	Supported
H_4 : IT-enabled market orientation will have a positive impact on technology ambidexterity	$\beta = 0.543^{***}$ $t = 6.69$	Supported

Note: $*p < 0.05$, $**p < 0.01$, $***p < 0.001$; IT refers to Information Technology; Supported hypotheses are represented in bold.

Common Method Bias Test

According to Podsakoff et al. (2003), common method bias or variance can be ascribed to the method rather than to the constructs the measures represent. There is disagreement, however, on whether the bias or variance really exists (Conway & Lance, 2010). Conway and Lance (2010) listed a number of misconceptions related to self-reported results and empirically showed otherwise. However, in the interest of intellectual rigor, this study addressed common method bias as detailed by Podsakoff et al. (2003).

First, following Podsakoff et al. (2003), social desirability-based common method bias may be resolved via ensuring anonymity and reducing evaluation anxiety. The survey emphasized that responses were confidential and that potential respondents were to fill out the survey of their own volition. This ensured that respondents were voluntarily filling out the survey and were under no duress.

Second, Podsakoff et al. (2003) suggested statistical and non-statistical procedures to identify and resolve common method bias (variance) in the responses. The statistical remedies recommended start with Harman's single factor to determine whether, in large part, the items load on to a single factor. Whereas the analytic approach taken by this dissertation was a PLS one utilizing Smart PLS, the exploratory factor analysis did not reveal most items loading on to a single factor. An alternative viable remedy would be to partial out a marker variable (Podsakoff et al. 2003). In their seminal article on this subject, Lindell and Whitney (2001) suggested partialling off the average correlation between the marker variable and other variables may allow for control of common method bias. Consequently, the survey included a set of three questions theoretically separate and distinct from questions related to other constructs.

Additionally, Kock (2015) recommended a technique based on full collinearity. Kock

(2015) asserted that whereas variance inflation factors (VIF) are generated for all latent variables in a model, a threshold VIF of 5 may be used to identify pathological collinearity and hence common method bias (Kock & Lynn, 2012; Kock, 2015). However, Kock and Lynn (2012), based on Hair et al. (2010), suggested a minimum threshold of 10 for the identification of common method bias, emphasizing the researcher must make an informed decision. In examining the outer VIF values, no construct had a VIF close to 10. Thus, common method bias (variance) was addressed on multiple levels.

Discussion

Technology ambidexterity has been studied from the organizational perspective by many scholars (Andriopoulos & Lewis, 2009; Bot, 2012; Fernhaber & Patel, 2012; Gibson & Birkinshaw, 2004; Lubatkin, Simsek, Ling, & Viega, 2006; Raisch et al., 2009; Tushman & O'Reilly, 1996; Wang & Rafiq, 2014). This study extended the understanding of technology ambidexterity by examining the antecedents to technology ambidexterity and then linking it to startup success.

This study makes three important contributions to the extant literature. First, this study theorized the construct of technology ambidexterity in the context of startups. Technology ambidexterity has heretofore been studied in a limited set of contexts and applications (Bot, 2012; Fernhaber & Patel, 2012; Wang & Rafiq, 2014). However, this study extended this notion to the domain of startups by relating it to key antecedents from the IT literature. This study also provided a means for modeling technology ambidexterity through a product indicant approach involving IT exploration and IT exploitation. These are unique contributions to the literature in terms of providing a foundational perspective on theorizing and modeling technology ambidexterity.

Second, technology ambidexterity was found to positively influence startup success, lending credence to Tushman and O'Reilly's (1996) assertion that exploration in the absence of exploitation and vice-versa does not bode well for firm success. Notably, findings confirmed the dynamic capabilities perspective which states that firms that exploit and explore can achieve superior benefits (Lee et al., 2015; Subramani, 2004), creating competitive advantage (Schreuders & Legesse, 2012). This is a key contribution to extant research since it validates the complementarity of IT exploration and IT exploitation (Dyer & Singh, 1998; Lee et al., 2015). In other words, both IT exploration and IT exploitation are needed for a startup firm to be successful. Taken together, while IT exploitation may provide a basis for startup firms to survive in the marketplace, IT exploration provides the leverage needed to be successful.

Third, this study showed that three IT-oriented antecedent factors can impact technology ambidexterity in a startup. Shared IT vision was found to have a positive impact on technology ambidexterity. This shows that promoting an IT vision and innovation mindset in the organization can be extremely beneficial for startups (Viki, 2017). As startups coalesce around a well-articulated central IT vision, they develop a clear perspective about the use of IT in their startup and can simultaneously explore and exploit technology benefits. IT strategic thinking was also found to have a positive impact on technology ambidexterity. Hitt et al. (2001) posited that entrepreneurs need to think strategically about IT to create value; consistent with extant research, this finding implies that startups that strategically deploy IT can reap benefits through technology ambidexterity. Finally, IT market orientation was found to have a strong impact on technology ambidexterity. This means that as startups scan the environment for new IT solutions, implement them, and periodically review IT in product development to match customer needs, they are likely to achieve success through technological ambidexterity.

IT absorptive capacity was dropped from the model specification. The rationale was that the remaining antecedents gave a better model fit. Additionally, following Zahra and George (2002b), absorptive capacity was made up of two components—potential and exploited. Potential absorptive capacity was captured within IT vision and IT strategic thinking and exploited absorptive capacity was captured by startup success.

Implications for Research and Practice

Implications for Research

This study has three important implications for research. First, while the research model addressed three antecedents—IT vision, IT strategic thinking, and IT market orientation—future research can explore the role of other antecedent conditions. Future research may include the role of technology investment as an added antecedent. Lubatkin et al. (2006) looked at the role of the top management team in the organization's achievement of technology ambidexterity. However, the top management team's role in developing the antecedents (portrayed in the present study) as well as technology investments, may yield some interesting results. Further, behavioral integration of the top management team may be expanded to include integration of the entire organization.

Second, IT absorptive capacity was dropped from the model as its inclusion gave sub-optimal results. This opens up a slightly different path to future research. How does absorptive capacity influence technology ambidexterity? Further, researching whether absorptive capacity follows technology ambidexterity or vice-versa is an avenue that can be pursued, which could lead future researchers to delve into the sequence of exploration and exploitation and the conditions under which technology ambidexterity becomes an imperative. Yet another research stream in this realm would be technology ambidexterity and competition.

Finally, it is clear that startups are driven to explore new technologies; the level of competition in an industry may indeed be an antecedent to technology ambidexterity, forcing the startup to accelerate the rate of ambidexterity. From a practitioner perspective, speed to market is an important determinant of the operationalization of technology ambidexterity. Future research should include an examination of how speed to market affects organization decisions to explore and exploit technology.

Implications for Practice

This study has empirically confirmed what scholars have emphasized mainly in the context of large companies: the role of technology ambidexterity. The study provides startups an IT ambidexterity framework that emphasizes the role that IT vision and IT strategic thinking rooted in market orientation can play in startup success. It gives startups a theoretically sound and empirically tested model of technology ambidexterity, its antecedents, and how they affect startup success.

Technology plays an important and preeminent role in startup survival and success. That technology plays a prominent role in innovation is now an established fact (Desai, 2018). For example, Audretsch (1995) found that the survival rate of startups is a function of the underlying technological conditions and contended that startups that innovate exhibit higher growth and survival rates. This study provides a roadmap for startups that are survival-challenged. Technology ambidexterity can play a dominant role in the survival and growth of the company.

In this regard, the imperative of the antecedents to technology ambidexterity is worth noting. Startups that have a compelling IT vision, strategically driven and oriented towards the market, are more likely to balance exploration and exploitation, thus increasing the chances for success. It is also worth noting that even for startups that are resource challenged, it is worth

pursuing a clear vision that is shared within the startup. Firms too often assign the vision and the strategy as domains of the top leadership (Lubatkin et al., 2006). However, findings from this study showed that the chances of startup success are enhanced if the vision has employee buy-in. Similarly, startups can begin to invest in strategically thinking about IT investments and to perform activities such as continuous environmental scanning that can lead them to achieve success.

Limitations

This study also has some limitations. First, although the sample size of 220 was more than the required number of responses, a larger sample may help provide more validity to the results. Second, the study pursued a parsimonious model. As mentioned earlier, it would be worthwhile to pursue more antecedents such as technology investments and behavioral aspects of not only the top management but of the entire organization. The organizational elements are crucial for technology ambidexterity to be realized. Finally, this study did not examine the organizational environment conducive to achieving technology ambidexterity. Although the type of industry and level of technology were considered as a proxy for the environmental conditions, more environmental factors could have been considered in this study.

Conclusion

The main purpose of the study was to increase the understanding of how technology ambidexterity, together with its antecedents, affects startup success. Technology plays an important role in facilitating ambidexterity in an organization (Tushman & O'Reilly, 2013). Technology thus requires an explicit articulation of its effects on startup success as well as inclusion in any empirical model. This study contributes to the literature in several important ways. First, it contributes to extant literature on ambidexterity by empirically linking technology

ambidexterity to startup success. Second, the research model laid out the link between technology ambidexterity and its antecedents. Third, the study empirically supported the notion of IT as a dynamic capability. Fourth, it is the first known study that empirically tested the mediating effects of technology ambidexterity between technology antecedents and startup success. Thus, this research has important academic and practical implications for understanding the ambidextrous role of technology in startups, as well as providing a foundation for startups to acquire such ambidexterity.

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CHAPTER 4: DISSERTATION CONCLUSION

This dissertation began with the premise that startups are often faced with unique dual-challenges: to explore new pursuits and to exploit existing opportunities (Foreby, Tammisto & Aberg, 2016). These existential challenges necessitate a certain amount of reliance on partners, and management of such relationship dynamics and technology resources are significant considerations as part of startup survival (Liao & Welsch, 2005). Consequently, the purpose of this dissertation is to understand the antecedents and consequences of relational embeddedness (trust, cooperation, and network building) and technology ambidexterity (Information Technology -IT- exploration and Information Technology-IT- exploitation) in the context of startups.

Through a survey of startups, this dissertation makes important contributions to the extant literature on startups, while providing practical contributions to current and would-be startup entrepreneurs. Essay 1 (Chapter 2) provided a nomological network of factors that predict startup success from the perspective of relational embeddedness. Study results showed that startup firms can develop interorganizational trust, cooperation, and network building by utilizing informal coordination mechanisms. Formal coordination can help startups to leverage networks. Further, engaging in building relational embeddedness through developing cooperation can help startup firms achieve success. Based on the size of the startup, interorganizational trust can determine the success of the startup, with larger firms achieving more benefits from trust than smaller firms.

Essay 2 (Chapter 3) showed that technology ambidexterity is an important mediator of startup success from the perspective of IT utilization in startups. Study results showed that technology ambidexterity, which is a combination of IT exploration and IT exploitation, can provide superior benefits to startups. Results also showed that when startups have shared IT

vision, strategic thinking about IT, and market orientation towards IT, they tend to engage in both exploiting and exploring IT solutions.

This dissertation, therefore, makes substantial contributions to the existing literature on startups by contributing to both the management and IT perspectives. Findings from this dissertation can be utilized by academics to engage in future research opportunities into the governance, leadership, and technological aspects of startups. As competitive pressure to thrive grows, startup entrepreneurs can utilize the findings from this dissertation to invest in developing relationships with partners and their own firm's technology ambidexterity, to achieve startup success.

References

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APPENDIX: IMPLIED CONSENT FORM

University of Wisconsin - Whitewater Consent Agreement for Online Research Study Involving Human Subjects

Title: Key Success Factors of Startups

Investigator(s):

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Description:

This study seeks to gather information about startup success, the relationship with its partners, and how technology is viewed and used in the startup. The study will present you with three short sections focused on several aspects of the startup, followed by some demographic information.

Research Risks:

We do not anticipate any risks from participating in this study. Many precautions have been taken to ensure the security and privacy of your responses. However, as a participant in electronically collected research data, you need to be aware that there is always a risk of intrusion by outside agents such as hacking, and therefore a risk of being identified.

Research Benefits:

We will provide a summary report of aggregate findings to participants upon request. By participating in this study, you will be providing a great benefit to the literature in understanding how startup's relationship with partners and views of technology impact startup success. Through this study, we can also develop a practical model for startups to use to overcome startup survival challenges.

Special Populations:

N/A

Time Commitment and Payment:

Under twenty minutes

Safeguarding the Identity of Participants:

The survey does not request any specific identifying information. In addition, all information

that is generated by this study will be analyzed and presented in summary form only. Finally, upon completion of this survey, the responses will be removed from online storage and stored locally by the researchers. All information gathered in this research study will be stored in secure electronic and/or physical locations and protected to the extent afforded by law. However, since this research is conducted in a public education setting, some electronic communications may be subject to open records requests.

Consent for Future Use of Data:

Data, with all identifying information removed, will be kept indefinitely and may be used for future research by the researchers in this study or by others. Because all identifying information will be removed, your participation in this study authorizes this potential future use of unidentifiable data without further notification.

Right to Withdraw:

Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document after it has been submitted to the investigator.

IRB Approval:

This study has been reviewed and approved by The University of Wisconsin-Whitewater's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

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