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**The Incubator Investment in Network Events: Does the
Business Incubator's Quality of Programming and Founder
Personality Traits Influence Startup Performance?**

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Abstract

With the rise in business incubation and the competition to attract the most promising startups and demonstrate the best startup performance, business incubators are seeking a deeper understanding of the factors that affect performance and advice on where to spend their money. Business incubator directors are open to new models of incubator management that will drive improved outcomes. This dissertation suggests a new model of incubation that takes into consideration the moderating factors that drive greater participation in network events and greater use of the learning from these events to drive improved startup performance.

Business startup incubation is a successful proposition that demonstrates that an incubator-supported startup is more likely to fuel economic development and have a better chance of surviving and thriving over the long-term than other startups (Fry, 1987; Kuratko and LaFollette, 1987). While most research supports the proposition that incubators promote greater success in startups, only a few studies have addressed the disparity in the quality of programming and participation in programming at incubators.

With the growing number of incubators over the last decade, average spending by incubators is increasing and the variability of the incubator offerings is also increasing. This gives rise to new questions about which incubators provide the best outcomes for success. An important difference between this research and the present literature on business incubation is the emphasis on a new hybrid model of cohort structure, as well as the proposal of other incubator structure approaches to influence event participation, including incubator manager role, cohort culture, and the presence of founder traits of openness and conscientiousness.

Absent from existing literature (Mian et al., 2004 and 2006; Malan and Hammarlund, 2002; Aaboen, 2009; Schillitoe and Chakrabarti, 2010), is a study of the element of the network events, which are important for the growth of the startup founder and the success of the startup. It is important to understand the value of these network events and what factors within the startup founder's traits or the structure of the incubator will drive greater participation in those events and application of those learnings back to the startups.

This study finds both empirical and statistical support for the use of network events to drive startup participation. The study also shares empirical feedback around the components of the incubator structure that may continue to drive more effective selection of startup cohort participants, and proposes an incubator model that may support better participation and application for future testing.

This research contributes to business incubator literature in several important ways. First, it gives attention to the concept that network events are important program elements within a business incubator to drive participation by a startup founder. Second, it proposes additional selection criteria to consider when evaluating startup founder cohort applicants. In particular, it explores the Big-Five Model of personality traits and openness and conscientiousness trait screening in particular. Third, the model proposes the need for a full-time incubator manager whose primary role is to serve in an advisory capacity and to facilitate the hybrid approach to cohort culture recommended in the new model. Finally, it recommends a hybrid cohort culture model whereby the incubator manager creates a competitive structure to drive participation in network events, but then adjusts the cohort culture structure to collaborative to facilitate greater information sharing across the startups.

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Chapter 1

Introduction

Business incubators have been on the rise since the 1980s. According to the National Business Incubation Association (NBIA, 2018), approximately 12 business incubators existed in the United States in the early 1980s, while more than 1,400 exist today. With the increase in the number of business incubators, approximately 40,000 new startups will receive incubator support this year. Incubator-supported startups are growing steadily and are consistently demonstrating an increased chance of long-term success. They also have a significantly greater impact on the economy than does the average startup (i.e., non-incubator supported startup) or small business.

The goals of business incubators have remained largely unchanged over the past 40 years. Incubators continue to focus on offering entrepreneurs the business support services, programming expertise, and funding they need to improve their chances of succeeding in the competitive business environment. As the number of incubators rises, so too does the variability and quality of the programming and other services that they provide (Tavoletti, 2012). When startups are accepted into incubators, the support they receive increases their likelihood of success.

Scholars have agreed since the 1980s that startups within an incubator have a greater ability to fuel economic development, and a better chance of surviving and thriving over the long term than other startups (Fry, 1987; Kuratko and LaFollette, 1987; Lumpkin and Ireland, 1988; and Udell, 1990). In more recent years, scholars have explored the positive impact of incubator services on a startup's survival, job creation, hiring, and turnover rate (Headd, 2003; Al-Mubarak and Busler, 2011; Voisey et al., 2013; Sehitoglu and Ozdemir, 2013). While most research supports the proposition that incubators promote greater success in startups, only a few studies have

addressed the disparity in the quality of the programming at incubators. These studies demonstrate that the success of an incubator and its startups is dependent on the quality of the incubator's programming and its practices as they relate to getting startups to participate in that programming (Moullin, 2003; Khan et al., 2011; Lewis et al., 2011).

While scholars have addressed the effectiveness of incubators in driving better outcomes for startup survivability, they have not examined incubator characteristics, startup founder personality traits, and the nature of the interactions between incubators and startups to see how they bring about better outcomes. As a result, the startup community is left with open questions regarding the effects that the characteristics of the incubator and certain personality traits of the startup founders, and the combined effects of both have on incubator-supported startup performance.

Research Purpose

This dissertation seeks to provide a deeper understanding of the factors that affect the disparity in the quality of the programming the incubators offer and the participation of the startups in the programming (Moullin, 2003; Lewis et al., 2001). With a steadily increasing number of incubators supporting startups, a deeper understanding of incubator characteristics is needed. Incubator characteristics include a variety of components that make up incubator models, including services such as programming, mentoring, technical assistance, the connecting of investors with the startups, technology support, physical space, and marketing support (Beckett and Berendsen, 2019; Klingbeil, 2017; Tavoletti, 2012; Chandra et al., 2009).

Scholars have explored some of the programming elements within an incubator model and have concluded that it is not enough to simply offer the programming services without considering

whether the startup founders will use the services and apply the learnings from the services in their businesses. To fully understand the impact that incubators and the services they provide have on a startup's performance, it is important to evaluate the personality traits of the startup founders and their role in getting the startups to apply the learnings that will drive their businesses forward. Therefore, a deeper understanding of the impact of incubator characteristics, startup founder personality traits, and the interactions between the incubator and the startup that lead to greater participation in incubator programming and better outcomes is needed.

This dissertation will evaluate the following five areas of literature to explain network service offerings, the role of the incubator to drive startup participation in its offerings, startup characteristics and founder personality traits and their impact on incubator service offerings, social exchange effects within an incubator, and the effects of competitive versus collaborative environments within an incubator.

The first area of literature focused on network service offerings. A few studies have reviewed network service offerings as a component of the services offered by incubators and have pointed to their importance as a contributor to startup success. These studies found that facilitating informal business networking (Weinberg et al., 2013) and connections with internal support functions (Patton et al., 2009) contribute, in part, to successful outcomes for startups. This dissertation will examine the extent to which the incubators in the study offer network events and whether greater participation in the network events yields greater incubator-supported startup performance. It will also review the competitive versus collaborative culture of incubators to determine whether the culture of the incubator influences the participation of startups in network events.

This study will use performance metrics from previous studies as the basis for measuring the performance of startups, but the fundamental difference between previous studies and this study is that here the focus is on a specific service—network events—and the impact that driving greater participation in these events might have on startup performance. It is not enough, however, to study whether increasing the number of or availability of network events will generate improved startup performance. Research is also needed on the impact that the moderating factors of 1) the founder's personality traits, 2) the presence of an incubator manager, and 3) competitive versus collaborative interactions among the startup cohort have on participation levels in network activities and ultimately on incubator-supported startup performance. More specifically, research should explore how founder personality traits and the presence of an incubator manager improve the participation level at incubator events and how competitive versus collaborative interactions affect startup performance.

In this dissertation, I will explore how founders who possess high levels of openness and conscientiousness help to drive network event participation and apply the learnings from the events in their businesses, resulting in better performance outcomes. Identifying the degree to which the moderating factors of the founder's personality traits, the presence of an incubator manager, and a competitive versus collaborative culture within the incubator impact the number of network events that the startup participates in is important for extending knowledge in this field.

The second area of literature will focus on the role that incubators play in driving startups to participate in network events. While an evaluation of the participation in network events furthers our knowledge about incubator models and startup performance, we must also focus on the startup founder's ability and willingness to use these network services and apply the learnings to the business. Therefore, this dissertation will study the founder's personality traits as there is an

expectation that some personality traits influence the tendencies of startups to use the services provided and apply the learnings to their businesses. To make this connection, I will evaluate the startup founder's personality traits as outlined by Barrick and Mount (1991) and the Big-Five Model (Costa and McCrae, 1992; Digman, 1990; Goldberg, 1990; John et al., 2008; Rauch, 2014).

The third area of literature will focus on startup characteristics and founder personality traits. Studies to date have focused on the following factors and their impacts on a startup's success: the startup's state of origin (Bartik, 1989); the founder's gender (Hanson, 2009), experience in business, and educational background (Pena, 2002); and the clustering of startups by the founder's background, age, and education (Wagner and Sternberg, 2004). There is, however, limited research connecting startup characteristics with participation in incubator network events and incubator-supported startup performance. To make this connection, researchers would need to evaluate the startup founder's personality traits as outlined by Barrick and Mount (1991) and the Big-Five Model (Costa and McCrae, 1992; Digman, 1990; Goldberg, 1990; John et al., 2008; Rauch, 2014). The two personality traits mentioned above—namely *openness* to experience (i.e., the “breadth, depth, originality and complexity of an individual's mental and experiential life”) and *conscientiousness* (i.e., the “socially prescribed impulse control that facilitates task-and goal-orientated behavior”)—have been found to be more prevalent in entrepreneurs than in other individuals (Zhao and Seibert, 2006). I will evaluate these personality traits in determining what approach to use to drive an increased level of startup participation in network events.

The fourth area of literature focused on the social exchange and alliance theory. This theory helps us to understand the exchange of information and insights between two parties—in this case, incubators and startups and startups with each other. Social exchange theory and social network

effects show that incubators can assist startups by encouraging them to participate in network events and by developing content for interrelationships among the cohort (Scillitoe and Chakrabarti, 2010; Rubin et al., 2015; Weinberg et al., 2013). Research has found that the most important aspect of the incubator-startup relationship is not the development of the networking events, but the reciprocity of the social exchanges at the events (Cropanzano, 2005). Numerous conceptual papers have discussed various aspects of social networks, including the existence and impact of tension within the networks, and the importance of trust in the social exchange and its role in driving greater positive exchange outcomes (Honig and Davidsson, 2000; Konovsky, 1994; Lambe, 2001). Other research has addressed the role of emotions (Lawler, 2001) and power and status conditions (Lawler, 1999) in the exchanges. In this dissertation, I will take a different point of view on social exchange in that I will explore competitive versus collaborative environments and their impacts on startups participating in network events (competitive) and on sharing and being mutually supportive (collaborative). I will also look at the role these environments can play in creating more positive outcomes for startup performance. My empirical research will explore whether the social dynamics of personal and professional networking activity within incubators are important for the success of the startups. This finding may indicate that incubators should serve as hubs for networking activities (Bollingtoft and Ulhoi, 2005).

The fifth area of literature will focus on the moderating effects of a competitive versus collaborative culture and cohort structures within incubators. There is research that outlines the organizational benefits of knowledge sharing (Patton et al., 2009) and the impact of a positive culture on startup success (Bollingtoft, 2012; Tötterman and Sten, 2005). A deeper understanding of the impact of adopting a combination of a competitive and collaborative culture that delivers greater startup success is necessary to developing a model for incubators. A competitive cohort

structure may facilitate greater participation in network events. Once the increased participation occurs, a shift to a contrasting collaborative framework may help startups succeed.

In this study, I will explore the impact of setting up a competitive cohort structure whereby startup cohorts compete against each other to drive greater participation in network events and thereby yield better startup outcomes. Additionally, I will look at how creating a competitive environment to drive startup participation in more network events, but then adjusting the environment to one that is more collaborative to increase shared learnings and mutual support as the startup cohort completes its incubation period is expected to yield improved startup performance outcomes.

In developing a proposed incubator model that facilitates greater startup performance, this study will look at facilitated network events, presence of an incubator manager, the moderating effects of the startup founder's personality traits, as well as the incubator's competitive versus collaborative culture.

Research Objective

The objective of this dissertation is to develop a model for incubators that takes into consideration the moderating factors that drive greater participation in network events and greater use of the learnings from these events, and that results in improved startup performance. This dissertation also seeks to connect factors like a startup founder's personality traits of openness and conscientiousness and incubator features like the presence of an incubator manager with a competitive versus collaborative culture. It looks at the ability of these factors to generate greater participation in network events, thereby positively impacting startup performance.

Fry (1987) was the first scholar to analyze incubator services. He found no statistical significance between the type of incubator facility and the services provided. Since then, scholars have attempted to analyze various elements of incubator programming to provide practical guidance to organizations and institutions that form incubators. Because of the large amount spent on incubator programs and the wide disparity in incubator programming quality, researchers have been seeking ways to determine the most important features of an incubator that might drive the greatest opportunity for startup performance success.

Allen and McCluskey's (1990) research on the presence of specific services offered by incubators yielded no statistically significant data. Instead, they found that studies, including their own, did not show a clear sense of the optimum policies or procedures for incubators. Since then, various other scholars have examined incubator business support services in their research. They have studied incubator characteristics, including the number of public-private partnerships, their connection to government as a basis for incubation, and their alignment with institutions of higher education (Lichtenstein, 1992; Lumpkin and Ireland, 1988; Scherer and McDonald, 1988).

In more recent years, scholars have researched the positive impact of incubator services on startup survival, turnover, employment and job creation (Headd, 2003; Al-Mubarak and Busler, 2011; Voisey et al., 2013; Sehitoglu and Ozdemir, 2013). While most research shows that incubators promote greater success in startups, only a few studies have addressed the disparity in the quality of the programming at incubators and the fact that the success of incubators and its startups is dependent on the programming and the practices the incubator adopts to improve startup performance (Moullin, 2003; Khan et al., 2011; Lewis et al., 2011). Other research has focused on whether technology related businesses have a greater success potential within an incubator framework (Mian, 1994; Swierczek, 1992; Markley and McNamara, 1995).

Even more recently, research on incubators has focused on specific elements of the incubator offerings, including the provision of facilities and office space as the most critical success factor (Aaboen, 2009), the presence of a strong mentoring program to support startups (Rubin et al., 2015), and the provision of services that are flexible and that address the specific needs of the startup founder (McAdam and McAdam, 2008; Hackett and Dilts, 2004).

While there is research that points to incubators as critical for economic development and provides for some recommended characteristics of those incubators, the current research does not seek to identify the programmatic components of the incubator offerings that drive greater startup performance. I seek to extend the literature on incubators to test the theory that participation in a particular incubator programming component—network events—increases the chances of startup success. I also look at the moderating effects that an incubator employing an incubator manager to support and encourage startups to participate in network events has on the overall participation levels.

I will examine two personality traits of startup founders—openness and conscientiousness—that drive them to participate in network events, to apply the learnings from these events to their businesses, and to be open to receiving guidance from the incubator’s relationship manager (Zhao and Seibert, 2006). This study will apply the principles of the Big-Five Model personality trait characteristics to founder personality traits. In addition, it explores the character traits of openness and conscientiousness to see if those who exhibit these traits at higher levels are more likely to participate in network events and more likely to take greater advantage of the learnings from these events to help facilitate the success of their startups. Research shows that entrepreneurs and managers have significantly different levels of conscientiousness (Zhao and Seibert, 2006) and that entrepreneurs are more open to new experiences than are other types of

managers. Researchers hypothesize that an entrepreneur is likely to be attracted to the changing environments and new challenges presented by an entrepreneurial venture (Kerr, Kerr and Zu, 2017). This study will evaluate the moderating impact that the startup founder traits of openness and conscientiousness have on the founder's participation in networking events and their acceptance of guidance from the incubator manager.

I will explore certain phenomena that take place within incubators where a competitive culture exists to drive greater attendance and participation in network events, but then, after the participation is increased, the effect that continuation of the competitive culture might have on hindering overall incubator-supported startup performance. In addition, I will review and evaluate the impact that shifting from a competitive culture to a collaborative culture (following the increased participation at the event) has on the performance of the entire startup cohort. As part of this evaluation, I will look at the positive effects on performance of a collaborative culture in which the startups implement the lessons from the network events in their businesses, share the learnings, and support fellow cohort members.

Research demonstrates that the benefits to organizations of two-way knowledge transfer (Patton et al., 2009), physical proximity of the incubator and the startups, and a positive culture impact the sense of community among the startups and their satisfaction with the incubator (Bollingtoft, 2012; Tötterman and Sten, 2005).

I seek to develop a framework, grounded in the literature, for future incubator models. The framework takes into account the impact that startup characteristics might have on startup performance and the factors that incubators consider in their evaluation of startups during the selection process. I will review the incubator manager role and also develop a framework for a

competitive model that drives event participation and then switches to a collaborative model that ultimately delivers a stronger startup performance.

Potential Contribution

The proliferation of incubators across the United States drives the need to conduct a more comprehensive study of the specific organizational components of the incubator. Such a study helps us to understand what the competitive differentiators are and to provide guidelines for the development of models that might drive increased startup success. As mentioned, with the growing number of incubators over the last decade, average spending by incubators is increasing and the variability of the incubator offerings is also increasing. This gives rise to new questions about which incubators provide the best outcome for success.

An article published by Startup North (2011) titled “Trying to Understand Incubator Math” puts the annual spending of incubators for capital investments, support costs like real estate, furniture, telecommunications, internet connectivity, incubator manager costs, event costs, etc., at approximately \$340,000 per cohort of 12 startups with an average of two cohorts per year. The costs associated with running an incubator give rise to incubator managers asking an increasing number of questions about what the optimal spending level is and where they should prioritize their spending to garner the best opportunity for successful performance outcomes.

Also, with the increasing number of incubators in existence and the variability in the programming, both startups and investors find themselves in a competitive position where they have choices in terms of with which incubator to associate. I provide insights into the types of evaluation criteria for selecting startups and elements of programming offerings that improve a startup’s chances for successful performance.

This dissertation contributes to the incubator, startup characteristic, and social exchange literatures in several ways. First, it evaluates existing research on the impact on performance that one element of an incubator—network events—has on startup success and then extends the research and makes recommendations for a model of an incubator that might improve startup performance outcomes. I will evaluate the programmatic elements of incubators, including the number of network events offered (event availability) and the startups’ participation in these events (event participation) as an indicator of potential future success. I also share insights as to the potential impact that the number of network events available and startup participation at these events might have on startup performance. Additionally, I evaluate the impact of several moderating factors on the incubator and the startup outcomes, including whether the presence of a dedicated incubator relationship manager will have an impact on increasing the attendance at network events and produce improved outcomes for startups.

Second, this dissertation extends the literature on startup founder personality traits, including the Big-Five personality traits. It reviews how the traits of openness and conscientiousness are moderating factors that get startups to increase their participation in network events and, that in turn, give rise to greater startup performance. This dissertation also informs the criteria by which incubators will evaluate startups in the future and serves as an additional guide in the selection process. Typically, evaluations are based solely on the business idea and the founder’s presentation, but the goal of this research is to provide a new framework by which startup founders are also rated on their level of openness and conscientiousness. This dissertation also evaluates the extent to which greater demonstrations of these two personality traits of the Big-Five Model impact network event participation, the ability and willingness of startup founders to apply

the learnings in their businesses, and thereby deliver overall improved incubator-supported startup performance.

Third, this research contributes to the literature on competitive versus collaborative cohort structure environments at incubators and the impacts of these environments on the success of startups. Research shows that competitive and collaborative cultures at incubators play a different role at various times in the lifecycle of the incubator cohort (Tötterman and Sten, 2005; Patton et al., 2009; Bollingtoft, 2012). I explore the phenomenon that exists whereby a competitive model drives greater participation in network events, but at the same competitive framework may inhibit information sharing and support within the cohort. I demonstrate that creating a competitive culture to drive greater network event participation is important, but then the incubator model must facilitate a more collaborative culture after the network events to drive the most benefit for the cohort and the best performance outcomes for the startups. I considered all of the aforementioned factors in developing an incubator model.

Organization of the Dissertation

Chapter 1 of this dissertation covers the research objectives and purpose, potential contributions of the research, and the organization of the dissertation. In so doing, it explores the literature and empirical evidence on incubators, startup characteristics, startup founder personality traits, social and network exchanges, and incubator-supported startup performance. Chapter 2 explores in more depth the literature and empirical evidence on incubator models and performance, startup performance, founder personality traits, and social exchange theory and also formulates hypotheses. It also connects findings from the existing research on these topics to identify the

characteristics of incubators and startups that together may deliver improved startup performance outcomes. Chapter 3 discusses the methods of research used in this study, including data collection, analyses, and interpretations. Chapter 4 discusses the research findings, including both those that support and those that contradict the hypotheses, and also addresses potential limitations of the research. Chapter 5 of this dissertation explores the implications of its findings for incubator managers, businesses, municipalities, organizations, and institutions of higher education. It also explores the implications for startups as they evaluate with which incubators to affiliate and investors as they evaluate investment opportunities in incubator startups. Chapter 5 also presents a proposed model for incubator management that includes startup selection criteria based on the personality traits of the founder. In addition, it explains the implications that the research findings have on incubator development, management, programming, and budgeting. Lastly, it identifies future research opportunities across the incubator and startup literatures to continue building on this rewarding field of study.

Chapter 2

Literature Review and Hypotheses

The relationships between startup business cohort members and their incubator and the relationship among the cohort members are important dynamics in driving successful startup outcomes within the incubator network. With the goal of applying research to practice and sharing insights for incubators to adopt to drive better outcomes, I studied the characteristics of incubator networks, the characteristics of the startups within the incubator cohort, and the competitive and collaborative experiences of startups within their social exchanges.

This literature review is divided into seven sections. First, I review studies of the role of the incubator and how the incubator model has traditionally added value to the startup founder and contributed to startup success.

Second, I review studies of the incubator structure and services—the incubator’s characteristics—that facilitate greater outcomes for startup success. I explore the way that the incubator was structured, the types of services it provides and the role it plays in supporting the startup.

Third, I review studies of the role of incubator manager and the role that the incubator manager might play in facilitating programming to the startup founder.

Fourth, I review studies of the characteristics of startups and the personality traits of the startup founders. These studies focus on understanding the personality traits of openness and conscientiousness that make a startup founder more open to taking advantage of the incubator’s services and guidance.

Fifth, I review studies of the social effects and network effects of the incubator. Specifically, how the linkage and exchange between the characteristics of the founder and the incubator and its manager would further improve participation within the network events and ultimately startup success.

Sixth, I review studies of the importance of network events and explore the linkage between higher participation in networking events by startups and the possibility that this will drive better incubator-supported performance outcomes from startups.

Seventh, I review studies of a competitive versus a collaborative cohort structure environment in an incubator setting. While the literature contains research on the impact that incubator services and startup founder personality traits have on startup success rates, there are fundamental best practices that facilitate the offering of services in both a competitive and collaborative environment that might lead to greater participation in network events and, in turn, to greater outcomes.

The Role of the Incubator

Existing research on incubation has found that the business incubation process adds value by accelerating the growth of startup businesses and identifying ways for them to maximize their potential for success. The incubation process also adds value by creating jobs and attracting outsider investors to invest in the startups. There is considerable research on the development and functioning of incubators over time, starting with the first incubator, which was established in New York in 1959 (Lewis, 2001) and the first public incubator, which was established in Philadelphia in 1964 (Campbell and Allen, 1987). The bulk of research during that time focused on a general

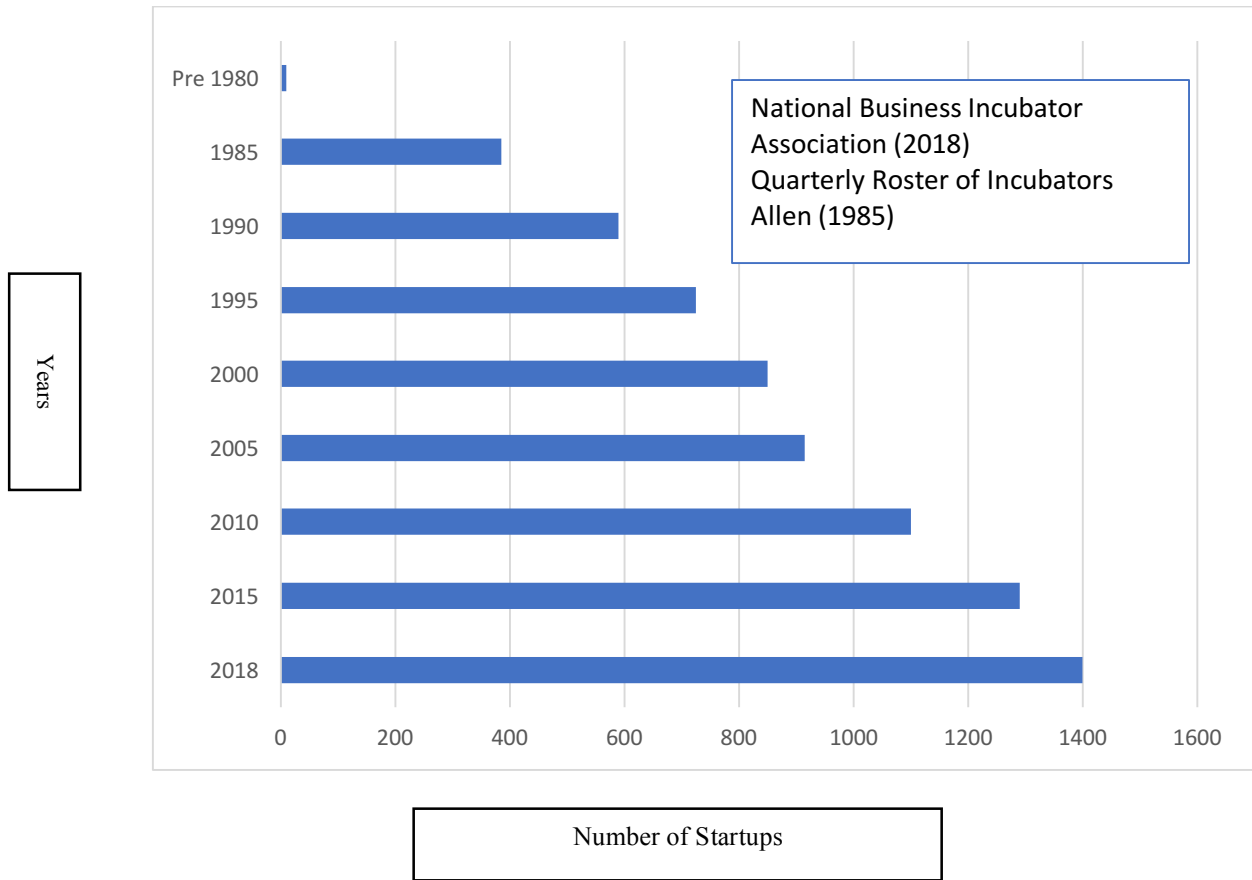
evaluation of the incubator phenomenon and on its driving the creation of businesses or on its transferring technological knowledge across different parties (Adkins, 2001). Only more recently have researchers been studying the structure and management practices of incubators to drive greater startup success (Scheirer, 1985; Bowman-Upton, 1989; Hackett and Dilts, 2004).

In the 1960s and 1970s, incubator research focused on government funded programs that fueled economic development and replaced aging business models as well as on corporations that were abandoning once prosperous but, at that time, struggling cities in the United States (Hackett and Dilts, 2004). By the 1980s and 1990s, government funded programs led to an increased focus on innovations and better protection of intellectual property rights, along with the commercialization of biomedical research (Hackett and Dilts, 2004).

Researchers like Temali and Campbell (1984) surveyed 55 incubators to understand the role of incubators, the structure of incubators, and the services provided by incubators. Campbell and Allen (1987) divided incubators into two categories—publicly funded (including university funded) organizations established to conduct continuing research or to drive economic development and privately funded organizations established to incubate new, high-tech growth ventures.

More recently, researchers have evaluated the structure of incubators and their impact on the community's economic development (Markley and McNamara, 1995; Mian et al., 2016). The focus of their research has been on cohort selection and the identification of “weak-but-promising” startups as optimal for selection to incubators (Culp, 1996). Mian et al. (2016) reviewed business incubator literature and found great interest in the topics of accelerators versus incubators and of scaling a successful business rather than incubating a startup business.

Figure 1: Growth of Incubators



The challenge with existing business incubator research is that hardly any of the research has focused on the development of best practices in running the incubators so as to generate the greatest chances of successful outcomes. Instead, most of the existing research has focused on the physical attributes of the incubator like its facility; the relationship of the incubator to the community; the type of funding it receives (i.e., whether it is publicly or privately funded); and the relationship it has with the local government (Campell and Allen, 1987; Hackett and Dilts, 2004; Phan e al, 2005; Mian et al., 2016; Ribeiro-Soriano, 2016).

Recent literature has evaluated the business and support services provided within an incubator framework (Mian et al., 2004 and 2016; Malan and Hammarlund, 2002; Aaboen, 2009; Schillitoe and Chakrabarti, 2010). In the Malan and Hammarlund study (2002), researchers surveyed incubator managers and all agreed that the quality of business support services, and not the physical attributes of the incubator, is the most critical aspect of the incubator's operations. They reviewed five key areas of business—facilities, entrepreneurship training, business advice, financial support, and technology support. They concluded that the value-add of an incubator is in the large number and types of business support services provided to their startup clients and in the high quality of these services. Mian (1994) examined six incubators in the United States and found that the incubator startups shared similar characteristics along three dimensions. The first dimension was the characteristics of the incubators themselves; the second was the characteristics of the startups; and the third was the characteristics of the entrepreneur.

Absent from existing research is the element of the network events, which are important for the growth of the startup founder and the success of the startup. It is necessary to establish best practices for developing incubation methods that increase the chances of entrepreneurial success or reduce the chances of entrepreneurial failure. With the recognition that the physical location and office setup of the incubator are indeed important, but only one component of the overall incubation picture, I have developed a framework for additional elements beyond the facility that may assist in driving greater startup success.

There is a strong desire within the incubator community to identify best practices in running business incubators. This research establishes a formula for best practices that will drive more successful outcomes.

The Role of Incubator Characteristics

The literature shows that not all incubators are created equal (Rice, 2002; Bergek and Norman, 2008; McAdam and McAdam, 2008; Hackett and Dilts, 2004; Aaboen, 2009). Researchers have explored various characteristics of incubators that make them more successful than others. These characteristics are often internal to the incubator and external to the startup, but the research falls short of mapping out key characteristics of the incubator offerings that motivate startups to participate in network activities.

Incubators introduced educational programs in the late 1980s and early 1990s with a focus on providing formal educational programs and teaching business skills. They also began offering shared services directly to startups, such as shared conference rooms, copiers, and cafeterias, as well as discounted, shared services provided by outside vendors, such as accounting, legal, receptionist, and administrative services (Brooks, 1986; Reynolds, 1987; Kazanjian, 1988; Allen and McCluskey, 1990).

Researchers have reviewed some of the tactics employed in the offering of shared services. Kuratko and LaFollette (1987) found that shared services like technology, a shared conference room, and a shared receptionist did little to advance the success metrics of the startups, and their research made the case for more educational services. Up until this point, the only shared services surveyed were business planning, accounting, marketing, computer training, legal services, and government procurement. Albort-Morant and Ribeiro-Soriano (2016) found that existing research had not settled on a structure or service model that would drive the best performance outcomes.

They suggested that there was a need for further study of the types and quality of support services that would be of value for incubators and the startup cohorts.

By the mid-2000s, researchers began exploring the topic of incubator configurations. They recognized that a framework for the services the incubators offered was necessary in multiple categories, including infrastructure, business support, and networking services. Their goal was to understand which services were more valuable and which factors contributed most to the success of incubations and new business creation. Rice (2002) explored the role of advisors and mentors in the incubator model. Aaboen (2009) found that incubator cohorts needed more than office space and facilities to be successful; additional common elements like sales support, shared accounting services, shared legal services (e.g., assistance with contracts and patents), and joint marketing were important to success. Schillitoe and Chakrabarti (2010) found that frequent counseling sessions strengthen the relationship between the incubator and its cohort.

Researchers have evaluated the growing level of sophistication that startups have with the variety of incubator options available. Isabelle (2013) found that with the increased number of incubator options, startups are now evaluating the incubator offerings to determine which ones might lead to the greatest outcomes for their businesses. She outlined five key factors that impact the success of incubator offerings as stage of venture, fit with incubator's mission, selection and graduation policies, services provided, and network of partners. This study appears to be the first to recognize the importance of network events and the need for a services strategy within the business incubation model.

The implications of these findings are interesting in that they recognize that networking events are an important factor in driving startup success, but they only measure the presence of these events as part of the structure of the incubator. They do not consider the type and number of

events, the support the events receive at the participation level, and their impact on the success of the business. (Isabelle, 2013). As indicated earlier, it is not enough to offer the services without encouraging startup participation. Thus, whether incubators should have an increased focus on network events and the number of events facilitated is a critical question in the evolving field of business incubator research.

In this study, I explore whether increasing the number of network events, thereby driving greater opportunity for education and connections with others, will deliver greater overall incubator-supported startup performance.

H1: The number of incubator network events facilitated (“event availability”) is positively associated with startup participation.

The Role of the Startup Founder’s Personality Traits

Startup ventures and their founders have different strengths as they enter a business incubation program. Various characteristics of startups and their founders can explain the success of the startups (Bartik, 1989; Doutriaux, 1992; Wagner and Sternberg, 2004; Hanson, 2009). These characteristics are internal to the startup and include the startup’s states of origin (Bartik, 1989), financial indicators, and bootstrapping techniques (Jones and Jayawarna, 2010); and the founder’s gender (Hanson, 2009), personality traits (Doutriaux, 1992), experience (Pena, 2002), age and schooling (Wagner and Sternberg, 2004), and social networking ability (Witt, 2004 and 2008).

Research shows that even if the networks of startups is large and their access to services is high, the eventual outcome of these relationships and services is largely dependent on the

personality traits of the founders and their ability to network and to take advantage of the services offered by the incubators and to apply what is learned to their businesses (Witt et al., 2008). In studies of the impact of an entrepreneur's ability to form a network and leverage that network, researchers found that a lack of openness to the resources of the incubator means that a risk aversion exists (Hanson and Blake, 2009), which is detrimental to the overall success of the startup. Respect, affection, and empathy in an exchange produce trust, which researchers have found to be critical in getting the largest benefit out of network relationships (Witt et al., 2008; Hanson and Blake, 2009).

In this study, I used the Five Factor Personality Model (Thurstone, 1933; Goldberg, 1993) to explore startup founders' personality traits as the primary determinant of participation in network events and, in turn, the ability and willingness of the founders to incorporate the learnings in their businesses. Studies have found that entrepreneurial characteristics have more of an impact on the determination of whether a startup venture will be successful than market dynamics, research, experience, development expertise, and industry sector (Stuart and Abetti, 1987).

Other research has found that entrepreneurs are consistently more open to new experiences than are managers and that they have a higher conscientiousness level than managers. Therefore, I focus on these two parts of the Big-Five personality domains—conscientiousness and openness (John and Srivastava, 1999; John and Naumann, 2007). In this study, I looked at the OCEAN of Personality explanation of the Big-Five Domains as outlined by John and Srivastava (1999) to explore the role that the characteristics of startup founders might have on their drive to participate in network events and to apply the learnings to their businesses.

As indicated earlier, the Big-Five trait of openness describes the “breadth, depth and originality of one's mental and experimental life resulting in more joy of learning and seeking

stimulating activities to break up a routine” (John and Srivastava, 1999). These traits manifest themselves in personality characteristics and actions like intellect, imagination/creativity, and perceptiveness (John and Srivastava, 1999). Soto and John (2008) added a few additional traits for evaluation in the openness category, including idealism and adventurousness.

These traits, like imagination and creativity, which likely drive founders to the entrepreneurial path in the first place, are also likely to improve the chances of founder participation in network activities. Traits like the joy of learning and an openness to new experiences and points of view may demonstrate an enhanced desire by founders to participate in as many network events as possible to increase their intellect on topics for their businesses. The idealism and creativity traits may provide a strong framework for founders to take the learnings from the various network events and apply them to their businesses, perhaps increasing their chances of success within their startup venture.

H2: Startup founder openness strengthens the positive association between the number of incubator events and startup event participation.

As indicated earlier, the Big-Five trait of conscientiousness is defined as “socially prescribed impulse control that facilitates task and goal-oriented behaviors” (John and Srivastava, 1999). This definition of conscientiousness covers achievement motivation and dependability. Research has shown that conscientiousness, openness to experience, emotional stability, and extraversion are positively related to a startup’s performance as measured by its survival, growth, and profitability (John et al., 2008; Zhao and Seibert, 2006; Zhao, 2010; Kerr, Kerr and Xu, 2017). In my research, I identified various lexical facets, drawing from Saucier and Ostendorf’s (1999)

exploration of conscientiousness facets like orderliness, industriousness, reliability, decisiveness, and perceptiveness. Soto and John (2008) added self-discipline in the category of conscientiousness.

The traits associated with conscientiousness, when applied to a founder-led business, increase the likelihood of success for the startup. Traits like orderliness, self-discipline, and industriousness, when applied to a startup and the services available to it, likely drive greater participation in network events and an increased chance of the learnings from the events being applied to business challenges.

H3: Startup founder conscientiousness strengthens the positive association between the number of incubator events and startup event participation.

In this dissertation, I seek to demonstrate how the presence of the two founder traits improves the likelihood of the founder participating in the network events. This provides practical application for incubator managers as they seek to identify what traits and characteristics they should measure in their applicant process so that they may select the founder participants who demonstrate the traits necessary for high participation levels and application of the learnings to their businesses.

The Role of the Incubator Manager

This research explores the need for an increased number of network events and the active participation of startups in these events. In this dissertation, I explore the idea that there are

moderating factors within the structure of the incubator that encourage participation. For example, I will look at the position of incubator manager and the role that person plays in encouraging participation in network events.

To the extent the incubator manager's role is seen as being an alliance partner to the startup cohort, an alliance with the manager can create interfirm trust. This trust may be a key factor in the support structure needed for the startup to perform better (Das and Teng, 1998).

Rice (2002) points to the quality of the management team and the adoption of a business-like approach to running incubators and monitoring startups as being critical to the performance and best practices of incubators. Malan and Hammarlund (2002) found that 70 percent of managers spent less than 50 percent of their time providing advice and direction to their startup clients. Schillitoe and Charkrabarti (2010) found that there is a need to professionalize the occupation of incubator manager and that the quality of the management team is a key to successful incubator activities. The role of the incubator manager is not only to ensure that the incubator itself operate in an efficient manner, but also that it provide advice to the startups (Schillitoe and Charkrabarti, 2010).

Other research has identified the presence of a dedicated manager for alliance relationships as having a direct correlation with success for startups (Kale, Dyer and Singh, 2001; Rice, 2002). Ferrary (2003) found that startups outside of the Silicon Valley were disadvantaged because they did not have access to an experienced incubator manager or a strong social network to support their business efforts. Florin et al. (2003) found that startups that were able to accumulate capital and leverage the position of incubator manager and the social network were more successful than other startups.

A Honig and Davidsson study from 2002 of 452 entrepreneurs found that the most important indicator of success is to have a supporting connection with an individual that provides encouragement and helps to keep the startup management accountable for the startup's goals. A 2005 study by Bollingtoft and Ulhoi of 16 startups found that many lacked personnel with managerial skills and general business skills that could be augmented by strong incubator managers as well as by additional services. Holmberg and Cummings (2009) found that the selection of an incubator manager is a critical determinant of the success of the alliance relationships.

The Organization of Economic Cooperation and Development (OECD) (2010) found that the greater the quality of incubator managers, as reflected by their business expertise and their past work experience, the greater the contributions they can make to the success of technology incubators. Scillitoe and Chakrabarti (2010) found that incubator managers can provide monitored business assistance and customized services to startups via frequent counseling interactions, which strengthens the relationship between incubator management and the startups. They also found that long-range planning by a dedicated manager at an incubator is important to overseeing the alliance and increasing the alliances prospects for longevity and prosperity.

Rahman and Korn (2014) found that an incubator's alliance unit should be run by an alliance manager who oversees all activities within the alliance and within the incubator structure. The alliance manager does not just support the startups' work within the incubator but also serves as a dedicated resource for the startups (Heimeriks et al., 2009). Rahman and Korn (2014) found that alliance longevity is not synonymous with alliance performance. This is an important finding because the incubator-startup relationship begins and ends in a fairly short period of time as outlined by the cohort timeline.

While existing research further indicates that the interaction between the incubator manager and the startups is an important indicator of success, it focuses more on advisory services provided and less on the encouragement or mandating of participation in incubator activities. Existing research does not address the speed with which alliances need to be created to have an impact on the cohort given the cohort's limited time within the incubator. I will explore how the incubator manager plays an important role in encouraging startups to participate in networking events, which results in better performance outcomes.

H4: The presence of a dedicated startup relationship manager role within the incubator strengthens the positive association between the number of incubator events and startup event participation.

Cohort Structure: Competition vs. Collaboration

Existing research is split on whether incubators should facilitate a competitive or collaborative cohort structure for the startups in the cohort. The literature on social exchange theory and on relationships between two trusted parties informs us that when a relationship between trusted parties exists within the incubator model, the relationship will further enhance the favorable outcomes because the exchange benefits both parties through a collaborative construct (Johanson and Mattson, 1987; Hu and Korneliussen, 1997; Dirks and Ferrin, 2002). Personal ties and cooperation between startups within an incubator may result in the startups acquiring complementary resources as well as in improved startup performance (Johanson and Mattson, 1987). The relationships may even result in the startups negotiating a collective services agreement

so that all members of the cohort get a group discount for shared services (Hu and Korneliussen, 1997; Dirks and Ferrin, 2002).

Research on the collaborative approach in a business construct shows that when the sentiments of collaboration and friendship exist within an exchange relationship it benefits the participants (Totterman, 2005; Lyons, 2002a). Arguments for collaboration within an incubator are rooted in the opportunities created by shared services and internal social exchanges with like-minded startups sharing the same space. Such a mutually supportive environment at the startup stage of businesses aids in their collective success (Totterman, 2005; Lyons, 2002a; Abduh and D'Souza, 2007; Patton et al., 2009). Pangarkar (2003) found that the more extensive the collaborations and the longer the alliances, the more positive the outcomes.

Rhoades and Eisenberger's (2002) study of social exchange theory and the advisory approach found that a competitive framework, or, at times, an adversarial approach to exchange relationships, kept them from being as fruitful as other types of exchanges. Other research has identified challenges with and the potential need to create a mix of collaborative and competitive frameworks within an incubator. Creating a more competitive structure to get startups to participate in services and access resources may drive higher levels of participation (McAdam and McAdam, 2008).

This dissertation explores how the Rhoades and Eisenberger (2002) approach to an occasional competitive framework might facilitate a level of competition between startups that results in their participation in network events. Soetanto and Jack (2016) argued that anything the incubators could do to incent startups to participate in the incubator events and services would be of great benefit to the startups. Given the personality traits of the startup founders, setting up a

competitive structure to drive participation may be a motivating factor for them to participate in incubator events and also apply the learnings from the events to their businesses.

H5: The presence of a collaborative cohort structure versus a competitive one (where collaborative=1, competitive=0) weakens the positive association between the number of incubator events and startup event participation.

Following the development of the Hypothesis 6 focused on higher startup event participation in incubator network events and its association to incubator-supported startup performance, I will return to collaborative versus competitive cohort structure as I explore cohort structure's moderating influence on the Event Participation and Performance relationship.

Social Exchange and the Network Effect

It is not enough to evaluate whether an incubator has network events or not and whether a startup founder's personality traits make the founder more open to implementing change within the incubator, without also understanding the interactions between startups and incubators. This study extends social exchange literature to demonstrate how the linkage and exchange between the characteristics of the founder and the incubator and its manager would further improve participation within the network events and ultimately startup success. The social exchange characteristics contribute to startup success over and above the startup characteristics and the incubator characteristics.

Homans (1958) defined social exchange theory as any interaction between individuals involving an exchange, which could be of goods or money, but could also be an intangible exchange, such as social or friendship exchanges. Emerson (1976) defined social exchange theory as a series of interactions that generate obligations and rules of exchange, including reciprocity rules and negotiated rules. Heide and John (1992) and Lambe et al. (2001) describe business-to-business exchanges as relying heavily on relational contracts or norms to govern the exchange process. This study reviews social exchange theory as it relates to relationships between two trusted parties (Dirks and Ferrin, 2002) and as it relates to advisory support (Rhoades and Eisenberger (2002). If a relationship between trusted parties exists within an incubator, one would expect a largely favorable outcome because the exchange would benefit both parties through a collaborative construct (Dirks and Ferrin, 2002).

Luo (2002) explored the impact of trust on the social exchange, including characteristic-based trust, process-based trust, and institution-based trust. Characteristic-based trust is similar to the kinship and clan membership described by Luo, but, in this instance, kinship is that of cohort status within the incubator rather than blood relationship. Process-based trust is the trust among cohort members as they work in the incubator program together. Institution-based trust is focused on the incubator-startup relationship and the trust of the startup founder that the incubator management and services are operating in the best interest of their shared success.

Pangarkar (2003) and Rahman and Korn (2014) explored short-term alliances and their potential to produce less satisfactory outcomes than longer-term alliances where complementary and more extensive collaboration may produce successful outcomes. Developing effective, long-term alliances is particularly challenging in the incubator structure given that the timeframe for a startup to be a member of an incubator cohort and to leverage the resources of the incubator is

limited. The personality traits of the founder and the functional support elements of the incubator along with the characteristics of the incubator manager are critical to supporting the quick and effective establishment of alliances that will have a positive impact.

The Importance of Network Events

The typical role of the incubator is to bring shared services, support, and learning opportunities to its chosen cohort of startups. This study contends that network events are a key driver of success because they provide deeper connections, drive engagement with others in a specific area of expertise, and provide learnings that can be applied to the startup's business.

A number of researchers have studied the role of network events or incubator-industry events for incubators and startups. Lichtenstein (1992) and Autio and Klofsten (1998) found that incubator-industry networks contributed to the success of startups. In their review of a variety of cases, both studies found that the incubators made an extensive use of external resources and emphasized hands-on network style events. They also found that there was a positive correlation between the enrollment of startups in network events and startup performance.

Hansen et al. (2000) found that incubators offering network events can leverage the events to ease the acquisition of resources and specialized expertise, provide learning opportunities, and allow startups to build up legitimacy faster. Nowak and Grantham (2000) outlined how access to networks and network events helps business incubators assist startups to overcome their inherent scarcity of resources.

Malan and Hammarlund (2002) studied the nature and range of business support services that vary by incubator. They found that offering a broad range of support services led to better

success indicators than offering a narrow range. Of the 15 incubators that they studied, networking of startups founders with other entrepreneurs and customers was only offered by five percent of them. Their study discussed the importance of encouraging networking between the startups within the incubators and found that it is common for business relationships to develop among the startups. They observed that internal networking encouraged by the incubators is critical for the sharing of information, ideas, and advice.

Other research focuses on incubator managers and their fostering of business connections between the startups, outside firms, governmental agencies, and potential investors and shows that network events might be the most critical function to driving better startup outcomes (Rubin et al., 2015). Soetanto and Jack (2016) argued that incubation support in the form of network events and entrepreneurial support services has a positive effect on startup performance and that anything the incubator could do to incent the startup to participate in the events and use the services would be of even greater benefit to the startup.

Incubators who have identified network events as critical to startup success follow widely varying approaches to boost participation in the events. Bergek and Norman (2008) found that some incubators follow a strong intervention approach, whereby they set up a competitive environment, while others follow a laissez-faire approach. Still others follow the incited approach, whereby they guide the startups through the incubation process with a steady hand, applying pressure by setting up a competitive framework, increasing the amount of shared services, or increasing advisory time to encourage participation (Bergek and Norman, 2008).

Isabelle (2013) found that a crucial component of the services that incubators offer is an extensive network of advisors, entrepreneurs in residence, partners, and service providers that complement the business assistance programs that incubator managers provide to entrepreneurs.

Isabelle recommended that startups seek a strong network event framework in an incubator, which would help them learn, grow, and potentially connect to additional sources of information, revenue generating activity, and ultimately funding. While Isabelle posits that a strong network event framework is critical to success, this research falls short of identifying how such a framework could be facilitated and encouraged within the incubator.

A higher rate of participation in networking events is critical to driving the best performance outcomes from startups. While existing research has identified the importance of encouraging networking and participation in network events, the research does not address the mechanisms by which an incubator and the incubator manager can encourage this participation (Bergek and Norman, 2008).

H6: Higher startup participation (“event participation”) in incubator network events is positively associated with incubator-supported startup performance.

A Return to Collaborative Versus Cohort Structure

The debate about whether an incubator should facilitate a collaborative or a competitive structure among cohort members has failed to take into account that a combination of approaches at different times within the incubation period might be the most impactful for successful outcomes. Collaborative relationships can involve formal or informal partnerships or just basic information sharing (Totterman, 2005; Lyons, 2002a). While a collaborative environment helps to facilitate successful interpersonal development and sharing, offering formal programming in a competitive way does not require startups to engage in personal capital and to make connections,

but they can show their enthusiasm for the contents of the events by participating and applying the learnings to their businesses (Abduh and D'Souza, 2007; Patton et al., 2009). This research suggests that if either approach (i.e., collaborative or competitive) were dominant it might have a hindering effect on networking. If the competitive framework is too rigid, it might hinder the collaboration or sharing of resources between the startups within the incubator (Bollingtoft, 2005).

This study seeks to understand whether a change in the structure from competitive to collaborative after the startups participate in the networking events might strengthen the relationships and asset sharing among the cohort and drive greater performance outcomes.

H7: The presence of a collaborative structure versus a competitive one (where collaborative=1, competitive=0) strengthens the positive association between the startup's participation in incubator network events and incubator-supported startup performance.

This dissertation will test the potential structure of an incubator network that would trigger greater participation in the network events. Based on the outcomes of this research, I will seek to develop flexible guidelines for a framework for participation in network events and for establishing competitive versus collaborative interactions (where collaborative=1 and competitive=0). The underlying idea is that, while a competitive environment among startups in the cohort might drive greater participation in network events, a collaborative environment would also be valuable in that it might encourage the sharing of information among members of the cohort. The premise is that different incubator features can be used at different times to benefit performance outcomes.

Our incubator model would consider the following:

First, all startups would be accepted in the incubator based on their business idea as well as the presence of strong ratings of the founder's personality traits of openness and conscientiousness. This would give strong indications that, in addition to a solid new business idea that has potential, the startup founder has the personality traits to engage in the most beneficial ways, adapt to their surroundings, participate in network events at a high-level, and also has the ability and tenacity to incorporate the learnings from these network events into the business.

Second, the availability of incubator managers would be an important asset to motivate founders and to create strong alliances within the incubator between themselves and the startup founders. The incubator managers would also play an important role in driving strong alliances between the network event leaders, the founders, and other members of the cohort (Bergek and Norman, 2008).

Third, I explore the role that incubator managers have in driving startup founders to participate in more network events. With network events being a critical driver of increased learning and enhanced alliance building (Isabelle, 2013), the incubator manager can create a competitive structure for driving participation at network events. This type of framework will attempt to incent cohort members to have greater participation than their counterparts in the network events.

Fourth, I explore the role that incubator managers play post-network events in which they switch from a competitive framework to a more collaborative framework for the cohort members as they seek to build a community around the learnings from the network events, other cross-functional services sharing, and contact sharing. This collaborative structure will also be critical in helping the startup founders overcome a sense of isolation that is often associated with entrepreneurial activities (Stuart and Abetti, 1987).

Drivers of participation in network events might be more effective if a competitive environment were to exist to encourage the cohort startup members to participate. However, at a later time, a collaborative cohort structure where leads and lessons learned are shared might be critical for improved startup outcomes. Hence, the final hypothesis of this research suggests that a competitive cohort structure serves a distinct purpose for one period of time, but should be adjusted during the course of the cohort's time in the incubator to one of a collaborative structure for the best outcomes. This dynamic and flexible model will work to benefit the startup and to drive deeper connections with the incubator manager and the other startup cohort members. The creation of this flexible model drives greater startup participation in the incubator network events and, in turn, is expected to drive improved overall outcomes in performance.

H8: Higher startup event participation in incubator network events mediates the relationship between the availability of incubator network events and incubator-supported startup performance.

While the number of incubators continues to rise in the United States to an expected 1,900 by 2021, the incubator model is seen as creating the opportunity to successfully drive innovation, create jobs, enhance profitability, and drive economic development (National Business Incubation Association, 2020). This research seeks to formulate new, practical recommendations for the creation of novel approaches to the day-to-day operations of incubators that may drive greater startup performance success.

With the elements of the incubator structure model outlined above and rooted in theoretical research, this dissertation seeks to show that a combination of factors like an incubator support

structure and an incubator manager, along with a founder with the personality traits of openness and conscientiousness will play a role in the participation of the founder in network events. This dissertation also seeks to bring understanding to the role that a flexible approach to a competitive and collaborative framework for the incubator may have on the participation of startups in the network events and then in the overall success of the startups. This dissertation additionally seeks to increase the understanding of whether the above-mentioned characteristics indicate the potential for greater startup success and can be applied to existing incubators for testing.

Chapter 3

Method and Variable Operationalization

Research Methodology

This chapter addresses the data collection approach, data sources, variable operationalizations, and sample to statistically test the hypotheses outlined in previous chapters. It identified a number of key indicators to test the impact of various startup founder and incubator characteristic, and the moderating and mediating impacts that they might have on a startup's participation and overall incubator-supported startup performance. This research used data collection methods of questionnaire survey methodology for the incubator to understand and evaluate the impact that these various factors might have on startup performance outcomes (Yin, 2004). The respondents are the startup founders who were cohorts in a business incubator within the last five years.

This research examined the impact that possible elements of an incubator model might have on the ultimate incubator-supported performance of the startup participants. These include the incubator's characteristics – services available and number of network events specifically, and the presence of an incubator manager and the role this individual plays in both encouraging participation at network events. It also evaluated the role that incubator manager may play in supporting the startup throughout the incubation journey. Next, the questionnaire assessed the characteristics of startups and the personality traits of the startup founders, focusing specifically on where the startup founder might fall on the prevalence of the personality traits of openness and conscientiousness as derived from the Big-Five methodology. Next, it studied the number of

network events available and startup participation in those network events. The questionnaire seeks to understand if the startup would define the incubator model as competitive, or collaborative and why. This research evaluated whether the incubator had a competitive structure in place to incent participation in the events and whether that moderated the level of startup founder participation. Finally, the study seeks to understand the performance indicators for the startup before and after the incubator participation to see if the startup benefited from the incubator model or other factors and ultimately had improved its incubator-supported startup performance.

Data Description, Sources and Sample

For this study, I defined business incubator programs as those that were current members of the National Business Incubation Association (NBIA), and/or were in the US and Canada and had been in operation within the last five years. As noted in Sherman and Chappel's research (1998), it is recognized that incubators were formed at different times with different economic implications which could impact the results of the comparison. To control for the age of incubation process, I have asked for startup founders from the last five years only – January 2015-August 2020.

Using the definition of business incubator above, the goal of this study was to identify 250 incubator-supported startup founders from different incubator programs in the US and Canada. A questionnaire was prepared and sent to startups at a minimum of 10 incubators where I had a relationship with leadership, and incubator leadership at a list of 545 incubators throughout the US and Canada. This represents outreach to 29 percent of the approximately 1,900 total incubators within North America. In response to email and phone follow-up, I expected to have useable data pulled from at least half of these select incubators within the US and Canada that have been in

operation over the last 5 years. Considering my network connections with the incubator field, I expected a reasonably strong response rate – conservatively 50 percent of the 250 (approximately 125) startup founders to respond with a fully completed response.

In addition, information was collected from a number of incubator-supported startup founders solicited to participate via LinkedIn. Our goal would be to receive completed responses from at least one quarter of the targeted incubators where researchers do not have personal interactions or experience. Across both the solicited and LinkedIn samples, surveys will not be included in formal empirical analysis if they are not filled out completely. These incomplete surveys will, however, be used for response rate calculations and analysis.

Business incubators seek to influence startup cohort performance by offering support and services delivered to create better success rates for the startup. There is a high degree of variation around services offered, management of the incubator, and participation by the cohort in the various services and programming offered. In addition, there is a high degree of variability around incubator-supported startup performance outcome and what might be deemed as success. For the purposes of this research, I identified number of jobs created (employees), increase in revenue (total revenue), number of sales completed (total products or services sold or total clients as an example), and outside investment received as the series of metrics by which I would measure successful startup performance outcomes.

Table 1: Variable Operationalization

Dependent Variable – Incubator-Supported Startup Performance

Measures of Startup Performance	
Number of jobs created	Number of employees before the incubation period - Number of employees at the end of the incubation period
Increase in revenue	Total revenue at the start of the incubation period - Total revenue at the end of the incubation period
Number of sales completed	Total products or services sold or total clients at the start of the incubation period - Total products or services sold or total clients at the end of the incubation period
Outside investment received	Total outside investment received at the start of the incubation period - Total outside investment received at the end of the incubation period

Survey Instrument

One survey instrument was created targeting incubator-supported startups who have been a part of a cohort within the last five years. This survey will be completed by startup founders.

Contact Information:

Contact Name

First Name

Last Name

Contact Title

Business Name

Phone Number

Business Address

Address

City

State (or Province)

Zip Code (or Postal Code)

Contact Email

Gender

Incubator Name

Country Where Founder Was Born

Country Where Business Was Incubated

Incubation Experience (Scale: Five-Point Agree/Disagree)

1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

1. The incubator experience was important to my startup's overall company performance.
2. My startup's business plan was advanced during the incubation period.
3. My startup's employee number increased by the end of the incubation period.
4. My startup is generating more revenue after the incubation period.
5. My startup increased the number of sales completed as a result of the incubation period
(this is defined as the number of completed sales transactions of products, services,
paying clients, etc.).
6. My startup received outside investment as a result of the incubation period.

Founder Traits (Scale: Five-Point Never/Always)

1 – Never Exhibits, 2 – Sometimes Exhibits, 3 – Moderately Exhibits, 4 – Often Exhibits, 5 – Always Exhibits

Scale:

Rate the presence of the following startup founder personality traits. Our startup founder is:

1. Orderly – neat, tidy, organized
2. Self-disciplined – the ability to motivate one's self, stay on track and do what is right
3. Industrious – regularly active and occupied, hard working
4. Reliable – consistent and trustworthy
5. Decisive – settling issues quickly, making clear and fast decisions
6. Conscientious – the desire to do well, be thorough, and ensure everything is complete
7. Perceptive – demonstrates the ability to see things others may not, to understand and figure things out
8. Intelligent – the ability to reason and understand things objectively
9. Imaginative / Creative – the ability to form new ideas, to be resourceful
10. An Idealist – the practice of pursuing ideals even if not generally considered realistic
11. Adventurous – a risk taker, daring, bold
12. Open – imaginative, curious, open to new things
13. Sociable – willing to talk and engage in activities with others
14. Assertive – having or showing a confident and forceful personality
15. Energetic – showing or involving great activity or vitality
16. Affectionate – readily feeling or showing fondness or tenderness

17. Outgoing – friendly
18. Extraverted – outgoing and socially confident
19. Trusting – showing a belief in another person's honesty or sincerity
20. Humble – showing a modest or low estimate of one's own importance
21. Patient – able to accept or tolerate delays without becoming annoyed or anxious
22. Helpful – giving or ready to give help
23. Agreeable – enjoyable and pleasant
24. Pessimistic – tending to see the worst aspect of things or believe the worst will happen
25. Moody – given to unpredictable changes of mood, gloominess or sullenness
26. Anxious – experiencing worry, unease, or nervousness
27. Insecure – not confident or assured
28. Self-Critical – critical of oneself, one's abilities, or one's actions
29. Vulnerable – susceptible to physical or emotional attack or harm
30. Neurotic – abnormally sensitive, obsessive, or anxious

Incubator Manager (Scale: Five-Point Agree/Disagree)

1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Scale:

1. The incubator had a manager that was present.
2. I interacted with the incubator manager regularly.
3. The insight and advice provided by the incubator manager was valuable to our startup.

Incubator Services Provided (Five-Point Agree/Disagree Scale)

1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 - Agree, 5 – Strongly Agree

1. The incubator had [program] available to our startup.
2. I attended all [program] events that were available to me.
3. I found the [program] events valuable to my startup.

Program List (to be inserted into the [Program] section above)

1. Business planning and forming a company – legal or planning support
2. Business Skills Training - Skill development of the startup founder on business skills like leadership, HR, management
3. Networking Events - With other entrepreneurs, community leaders, mentors, advisors or potential customers
4. Accounting, Legal or Finance Services
5. Market Research, Sales or Marketing Services
6. Engineering, Product Design or Technical Services
7. Bank Finance, Grants or Venture Capital Services

Incubator Approach (Scale: Five-Point Agree/Disagree)

1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree

Scale:

1. The incubator made participation in activities and events mandatory for startup cohort participants.
2. The incubator offered a contest, prize or financial incentive to a cohort winner(s) during the incubation period?
3. The incubator cohorts feel a sense of competition with each other.
4. The incubator cohorts feel a sense of collaboration with each other.
5. The incubator cohorts shared information with each other.
6. The incubator cohorts provided advice to each other.
7. The incubator cohorts celebrated each other's successes.

Other:

Is there anything else you would like to share with us about your incubator?

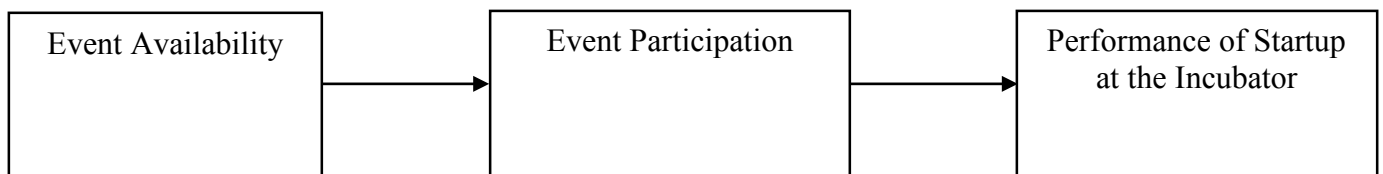
Thank you!

Variable Definitions and Operationalization

Dependent Variable – Incubator-Supported Startup Performance

The dependent variable of this study is related to the results of the incubation process or for our purposes, the performance of the startup. The participants were asked to evaluate whether progress was made during the startup incubation period and, more specifically, about whether value was created for them at the end of the incubator process. Progress defined by Witt (2004) includes whether the startup founder made progress from idea development to business planning and execution. A second, more subjective evaluation of the entrepreneurial success is satisfaction of a founder and whether they felt that the incubation period met or exceeded their expectations (Chandler and Hanks, 1993). The third success factor would include company-related success metrics such as survival of the startup company and its continued performance in the market. These metrics would include number of employees, growth indicators of sales, revenue increases and investment received.

Figure 2: Variable Operationalization
Independent Variable – Number of Network Events

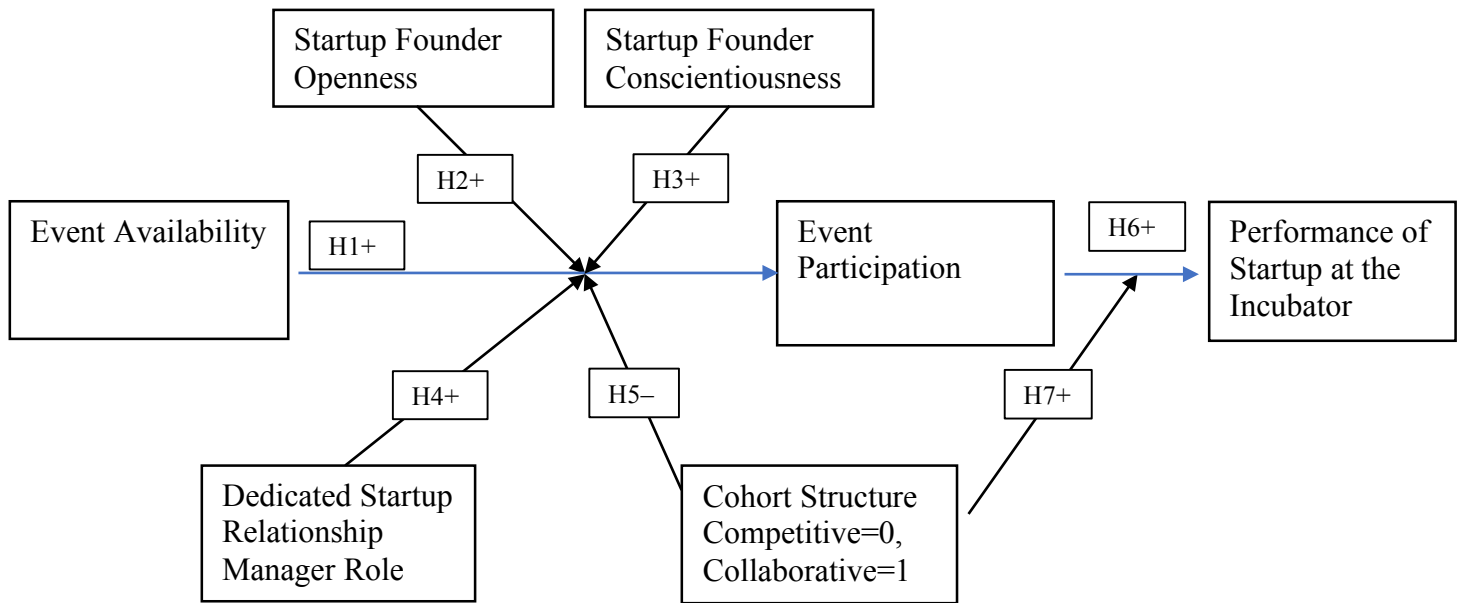


Independent Variable – Number of Network Events

The independent variable of this research focused on the number of network events offered. A number of researchers have studied the role of network events or incubator-industry events for incubators and startups. Lichtenstein (1992) and Autio and Klofsten (1998) found that incubator-industry networks contributed to the success of startups. In their review of a variety of cases, both studies found that the incubators made an extensive use of external resources and emphasized hands-on network style events. They also found that there was a positive correlation between the enrollment of startups in network events and incubator-supported startup performance. The presence of incubator services like network events and the subsequent use of the incubation services is a variable influencing the results of the incubation process.

While existing research has identified the importance of encouraging networking and participation in network events, the research does not address the mechanisms by which an incubator and the incubator manager can encourage this participation (Bergek and Norman, 2008). For this research, the list of incubator services is derived from the research of Bergek and Norman (2008) and Bruneel, et al. (2012), where they classified services into categories across both availability and participation. The participants were asked: “Were these available within the incubator?” and “To what extent did startups use the following services in your incubator?”

Figure 3
Variable Operationalization
Moderating Variables - Presence of a Dedicated Startup Relationship Manager, Presence of Competitive vs. Collaborative Structure, Presence of Startup Characteristics of Openness and Conscientiousness



Startup Founder Characteristics – Openness and Conscientiousness

Two moderating variables of this research will focus on the presence of individual characteristics or traits in the startup founder – specifically openness and conscientiousness – which were derived from the Five Factor Personality Model (Thurstone, 1933; Goldberg, 1993) and two parts of the Big-Five personality domains—conscientiousness and openness (John and Srivastava, 1999; John and Naumann, 2007). The goal is to explore the impact their presence might have in influencing startup success. As a contributing factor to explore whether the presence of these two characteristics in the startup founder might impact their participation in network events, and a

higher degree of ability and willingness of the founders to incorporate the learnings in their businesses.

The presence of these characteristics was listed in the survey instrument and participants were asked to grade their perceived level of facets of these traits from previous research by John et al. (2008); Zhao and Seibert (2006); Zhao (2010); Kerr, Kerr and Xu (2017). These included Saucier and Ostendorf's (1999) exploration of conscientiousness facets like orderliness, self-discipline industriousness, reliability, decisiveness, and perceptiveness, and Soto and John's (2008) addition of self-discipline in the category of conscientiousness. The Big-Five trait of openness manifests itself in phrases like intellect, imagination/creativity, and perceptiveness (John and Srivastava, 1999). Soto and John (2008) added a few additional traits for evaluation in the openness category, including idealism and adventurousness. For the Big-Five trait of conscientiousness, I will study elements like orderliness, industriousness, reliability, self-discipline, decisiveness, and perceptiveness which are drawn from Saucier and Ostendorf's (1999) exploration of conscientiousness facets like.

Identifying incubators who value these traits and can provide insights into their importance in startup founders would indicate that these founders will have a higher degree of participation in network activities and potentially better incubator-supported startup performance outcomes.

In this paper, it is argued that startup participation in network events is a key indicator of more successful incubator-supported startup performance outcomes. The nature of the cohort – whether a collaborative structure or a competitive structure is in place within the startup cohort – will play a role in participation in network events and those potential outcomes. Accordingly, it is expected that a higher startup participation in incubator network events will mediate the relationship between the number of incubator events offered and the startup performance. It is

expected that a competitive environment will drive more startups to participate in network events, but then switching to a collaborative framework amongst the cohort will lead to greater overall incubator-supported startup performance. To identify this mediating impact, I will survey the participants to understand whether the participation at activities and events were required/mandatory or optional. I will also survey to understand if the startup cohort felt collaborative with each other or competitive with each other, as well as whether the incubator had a cash prize for which the startups were competing. The belief here is that if there was a prize in place, that an underlying competitive framework was already in existence within the incubator.

Incubator Manager

The presence of incubator managers could be an important asset to motivate founders, and to create strong alliances within the incubator between themselves and the startup founders. The presence of this important role is a moderating variable to this research as it may have a direct impact on the encouragement of participation in network events and in driving strong alliances between the members of the cohort (Bergek and Norman, 2008). To the extent the incubator manager's role is seen as being an alliance partner to the startup cohort, an alliance with the manager can create interfirm trust. This trust may be a key factor in the support structure needed for the startup to perform better (Das and Teng, 1998). The survey includes questions about the presence of this role within the incubator and also the amount of time that the startup founder spends with this individual – both formally and informally – to seek clarity on whether the presence of a dedicated incubator manager role strengthens the positive association between the number of incubator events and the startup's participation in those events.

Cohort Structure

While existing research further finds that the interaction between the incubator manager and the startups is an important indicator of success, it focuses more on advisory services provided and less on the encouragement or mandating of participation in incubator activities. This research will explore the role that the incubator manager plays in setting up two additional moderating variables – the role that incubator managers play in driving startup founders to participate in more network events or a competitive cohort structure framework to encourage and incent participation. It also seeks to explain the role of the incubator manager plays post-network events, in creating a more collaborative framework for the cohort members as they seek to build a community around the learnings from the network events, other cross-functional services sharing, and contact sharing. This survey includes questions about whether network event participation was based on a competitive framework, a collaborative framework or a combination of two within the incubator.

For the purposes of this research, I will study whether the presence of a collaborative cohort structure weakens the positive association between the number of incubator events and startup event participation. I will also identify whether the presence of a collaborative structure strengthens the positive association between the startups participation in incubator network events and the collaborative approach to sharing those learnings for the mutual benefit of all startups. This research assesses if this shift had an impact on startup performance at the end of the incubation cohort cycle.

Statistical Model Estimation

Consistent with the empirical literature studying incubator and startup performance, I will survey incubators that have had active cohorts from within the last five years. I received a total of 133 responses with only 60 fully completed questionnaires in response to evaluate my hypotheses. I also solicited additional respondents through organic posts on LinkedIn, Twitter and Facebook that expanded the number of incubators surveyed and conducted a paid digital media campaign on LinkedIn targeted at those who followed incubators and had Founder or CEO titles in their profiles. The survey instrument used Qualtrics and was sent out two additional times to non-responder startup founders for a total of three attempted survey waves to get the maximum number of respondents.

For the purposes of understanding whether my hypotheses are supported, I utilized a number of statistical models. For the dependent variable of incubator-supported startup performance, I used an ordinary least square (OLS) method to estimate the unknown parameters in a linear regression model. I used the OLS method because I want to assess the incubator's number of network events and the startups' participation in network events as an indicator of better incubator-supported startup performance.

To compute the influence of four moderating variables of presence of incubator manager, startup characteristics of conscientiousness and openness, and cohort structure (where collaborative=1, competitive=0), I have a moderated linear multiple regression analysis. In my moderated regression equations, the dependent variable will have the independent variable (to compute its main effect), the moderating variable (to compute its main effect as a control variable), and the interaction term of the independent variable and the moderating variable (to compute the

moderating effect of the moderating variable on the main effect relationship between the independent variable and the dependent variable).

Equation 1:

$$Y = B_1 * X_1 + B_2 * X_2 + B_3 * X_3 + B_4 * X_4 + B_5 * X_5 + B_6 * X_1 * X_2 + B_7 * X_1 * X_3 + B_8 * X_1 * X_4 + B_9 * X_1 * X_5 + e$$

Where,

Y = Startup's Participation in Network Events

X1 = Incubator's Number of Network Events

X2 = Founder's Openness

X3 = Founder's Conscientiousness

X4 = Dedicated Startup Incubator Manager

X5 = Cohort Structure (Competitive=0; Collaborative=1)

e = constant error term

For the purposes of assessing the moderating effect of changing the cohort structure from competitive to collaborative during the incubation period, I use Equation 2 for the multiple linear regression analysis.

Equation 2:

$$Y = B_1 * X_1 + B_2 * X_2 + B_3 * X_1 * X_2 + e$$

Where,

Y = Performance of Startup at the Incubator

X1 = Startup's Participation in Network Events

$X_2 = \text{Cohort Structure (Competitive=0; Collaborative=1)}$

$e = \text{constant error term}$

In this model, I evaluated the impact of the startup characteristics of openness and then of consciousness on the startup founder's participation in network events to compute the moderating effect of each of those startup founder characteristics on participation in network events and startup performance. I also evaluated the impact that the presence of an incubator manager position has on the number of network events that a startup will participate in and the incubator-supported performance outcomes of that startup. I do the same for the final moderating variable of a competitive vs. collaborative framework set up within the incubator. In that moderating variable, I computed the effect that it has on the main effect relationship between the number of network events and the dependent variable of incubator-supported startup performance. The main independent variable of number of network events offered was used to understand the impact that the moderating element might have on the number of incubator events in which the startup will participate.

To test the effect of competitive vs. collaborative environment set up by the incubator and its impact on startup participation in network events and incubator-supported startup performance, I used a mediation model to identify and explain a potential observed relationship between both the independent and dependent variables as a result of the inclusion of a mediator variable. The idea is that rather than have a direct relationship between the number of incubator events offered and incubator-supported startup success, the mediation model will demonstrate that the mediating effect of a collaborative vs. competitive environment post startup event participation will have a relationship between the independent variable and the dependent variables – driving greater startup performance because the collaborative environment supports startups equally. Sobel (1982),

Baron and Kenny (1986) and Hayes (2009), outlined the requirements that must be met to form a mediation relationship and made the case that the mediation can still exist even in the absence of a “significant total effect.”

For this research, I also use the Sobel Test (1982), to understand the potential of partial mediation where the mediating variable may account for some, but not all, of the relationship between the number of events and the incubator-supported startup performance. In order to ascertain whether partial or full mediation has been established, I use the Sobel test to understand the effect. The Sobel test was used to determine whether a mediator carries influence of an independent variable to a dependent variable (Preacher and Hayes, 2004, 2008; MacKinnon and Dwyer, 1993; MacKinnon, Warsi, and Dwyer, 1995). In this case, this would be whether the mediator influences the number of network events and whether there is something like the structure of the competitive vs. collaborative framework of an incubator that can impact the dependent variable – incubator-supported startup performance. This tests the hypotheses that there is a potential difference between the effect of a specific independent variable – network events in this case – on the dependent variable – incubator-supported startup performance. It also allows us to understand the effect of the same independent variable – network events – on the dependent variable – performance – after taking into account the influence of the potential mediator – competitive vs. collaborative structure. This allows us to ascertain whether the mediator effect is significant or not and necessary to include in the incubator approach.

I also use the Hayes bootstrap testing method (Preacher and Hayes, 2004) to assess our mediating effects as the Hayes method allows us to have point estimates and confidence intervals to assess the significance or lack thereof of the mediation effect. This method provides us with point estimates that can reveal the mean over the number of samples and if zero does not fall

between the resulting confidence intervals, then I can conclude that there is a significant mediation present. In the Hayes analysis, I generated and evaluated a confidence interval and produced a range of whether this mediator is mediating successfully and to what percent of the effect of network events is passed through this mediator.

In this chapter, I elaborated on the methodology to empirically test the seven hypotheses that I advanced in the previous chapter. I provided the definition and operationalization of each of the variables. I presented the survey instrument, including the citations that serve as the foundation of each survey section, and I summarized the statistical models, estimation and equations that will serve as the basis for this research.

Chapter 4

Results

The objective of this study is to develop a model for incubators that takes into consideration the moderating factors that drive greater participation in network events and greater use of the learnings from these events, and that results in improved startup performance. The first section reports on the descriptive characteristics of the data and all variables included in the study. The next section includes the regression analyses to test the hypotheses of this study.

Descriptive Statistics

An initial total of 133 survey responses were submitted. Five responses were survey previews and were removed from the data. Sixty-eight respondents were removed because they did not fully complete the survey. A final total of 60 respondents were included in the analyses. All other missing values in the data were handled using pairwise exclusion. The majority of the participants were men ($n = 34$, 56.7%) and were the founders of their startup ($n = 37$, 61.7%). The country of origin was US for the majority of the sample ($n = 51$, 85%).

All Likert-type responses were coded into numerical values with a higher level of agreement corresponding to a higher value (e.g., *strongly disagree* = 1 and *strongly agree* = 5). The first three items pertaining to cohort structure were reverse-coded so that higher values corresponded to higher levels of collaboration for all items in the scale. Composite scores were computed by taking the mean of the Likert responses pertaining to each study variable. Cronbach's

alpha reliability coefficients for the items corresponding to the composite variables appear in Table 2.

Common method bias was assessed by conducting an exploratory factor analysis with all of the instruments' items with a forced 1-factor solution (i.e., Harmon single factor test). There is evidence for common method bias if a single factor explains more than 50% of the variance in the data. The results of this analysis showed that the forced 1-factor solution explained 24.73% of the variance in the data, indicating that the data were unlikely to be affected by common method bias.

Table 2

<i>Cronbach's Alpha Coefficients</i>	
Variable	Cronbach's Alpha
Performance	.87
Event Availability	.87
Event Participation	.87
Manager Role	.85
Conscientiousness	.81
Openness	.82
Cohort Structure	.53

Cohort structure was further coded into a binary variable based on the mid-point of the Likert scale. Participants with a mean composite score of 3.00 or lower were categorized as competitive and assigned a value of 0; participants with a mean composite score higher than 3.00 were categorized as collaborative and assigned a value of 1. The majority of participants were categorized as collaborative ($n = 50$, 83.3%).

Table 3 displays descriptive statistics, and bivariate correlations for each composite variable. Performance was significantly positively correlated with manager role ($r = .28$, $p < .05$)

and openness ($r = .30, p < .05$). Number of network events (i.e., event availability) was significantly positively correlated with participation ($r = .49, p < .001$), manager role ($r = .41, p < .001$), and cohort structure ($r = .33, p < .05$). Manager role was significantly positively correlated with cohort structure ($r = .28, p < .05$). Conscientiousness was significantly positively correlated with openness ($r = .49, p < .001$).

Table 3*Descriptive Statistic and Correlations for Study Variables*

Variable	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13
1. Performance	3.56	1.07													
2. Event Availability	3.78	0.88	.23												
3. Event Participation	3.73	0.88	-.10	.49**											
4. Manager Role	3.85	1.03	.28*	.41**	.25										
5. Conscientiousness	4.38	0.57	.05	-.15	-.01	.01									
6. Openness	4.37	0.56	.30*	.12	.20	.22	.49**								
7. Cohort Structure	0.83	0.38	0.23	.30*	.11	.29*	-.22	-.03							
8. Availability x Manager	14.90	5.72	.31*	.78**	.44**	.87**	-.07	.24	.32*						
9. Availability x Conscientiousness	16.45	4.26	.21	.86**	.48**	.38**	.36**	.31*	.21	.69**					
10. Availability x Openness	16.56	4.68	.32*	.90**	.52**	.45**	.06	.52**	.29*	.77**	.87**				
11. Availability x Structure	3.28	1.61	.271*	.66**	.30*	.34**	-.18	.09	.10	.56**	.52**	.60**			
12. Participation x Structure	3.16	1.61	0.22	.54**	.53**	.37**	-.07	.14	.05	.51**	.45**	.52**	.91**		
13. Gender	0.58	0.50	.14	-.16	-.33*	.04	-.07	-.07	-.17	.01	-.18	-.16	-.20	-.33*	
14. Country of Origin	0.18	0.38	-.11	.16	.07	.13	-.14	-.07	.05	.13	.07	.14	.17	.14	-.07

Notes. Spearman Rho computed for all correlations with binary variables (7, 13, 14). * $p < .05$. ** $p < .01$.

Inferential Statistics

The study hypotheses were addressed by conducting a series of linear regressions. In the first regression, the dependent variable was event participation, the independent variable was event availability, and the moderating variables of manager role, conscientiousness, openness, and cohort structure were included as predictors. Cohort structure was entered as a binary variable coded as competitive = 0 and collaborative = 1. Interaction terms between the independent variable and each moderator also were included as predictors. All continuous predictors were mean centered before computing the interaction terms and entering the variables into the regression.

The second regression was conducted using the PROCESS custom dialog for SPSS (model number 14) in order to estimate mediation effects. In the second regression, the dependent variable was performance, the independent variable was event availability, the mediating variable was event participation, and the moderating variable cohort structure was included as a predictor. Cohort structure was entered as a binary variable coded as competitive = 0 and collaborative = 1. Interaction terms between the independent variable and the moderator also was included as a predictor. All continuous predictors were mean centered before computing the interaction terms and entering the variables into the regression. Bootstrapping using 5,000 samples via the PROCESS macro in SPSS was used to estimate confidence intervals (CIs) for the indirect effect of event availability on performance through event participation. A confidence interval for the indirect effect that does not contain zero would indicate that the indirect effect is significantly different from zero and mediation is occurring.

For each regression, the assumptions of normality, homoscedasticity, and absence of multicollinearity were assessed. Normality was assessed by examination of normal P-P plots of

the regression residuals (see Appendix A); there were no strong deviations from normality observed.

Homoscedasticity was assessed by examination of scatterplots of residuals versus predicted values (see Appendix B); the data were approximately randomly distributed around zero, indicating that the data were homoscedastic. Multicollinearity was assessed by computing variance inflation factors (VIFs). All VIFs were below 10, indicating that there was no severe multicollinearity in the data.

H1 Result

H1 states that event availability is positively associated with event participation. It was theorized that if network events were made available to incubator cohorts, that they would understand the importance of this type of event and attend. Further, they would likely make attending these events a priority as it relates to other activities requiring their attention.

This hypothesis was tested in the first regression analysis. The overall model for the first regression model was significant, $F(11, 44) = 2.89, p < .05, R^2 = .42$, indicating that this model significantly predicted event participation and explained 42 percent of the variability in event participation. Table 4 displays the results for the individual regression coefficients. Event availability was a significant positive predictor of event participation ($\beta = 0.76, p < .05$), indicating that as event availability increased, event participants tended to increase. H1 was significantly supported.

Table 4*Coefficients for Linear Regression Predicting Event Participation*

Variable	Model 1	Model 2	Model 3	Model 4
Gender	-0.61 (-2.56)*	-0.49 (-2.21)*	-0.35 (-1.47)	-0.39 (-1.64)
Country of Origin	0.04 (0.12)	-0.05 (-0.17)	-0.01 (-0.04)	0.07 (0.26)
Openness	0.28(1.15)	0.15 (0.63)	0.31 (1.24)	0.27 (1.07)
Conscientiousness	-0.14 (-0.59)	-0.03 (-0.14)	-0.06 (-0.23)	-0.11 (-0.43)
Manager Role	0.17 (1.43)	0.08 (0.66)	0.04 (0.36)	0.06 (0.48)
Cohort Structure	0.22 (0.63)	-0.28 (-0.78)	-0.15 (-0.39)	-0.26 (-0.62)
Event Availability (H1)		0.48 (2.92)**	0.40 (2.40)*	0.76 (2.38)*
Event Availability x Openness (H2)			0.08 (0.20)	-0.10 (-0.25)
Event Availability x Conscientiousness (H3)			0.28 (0.95)	0.43 (1.40)
Event Availability x Manager Role (H4)				0.24 (1.91)†
Event Availability x Cohort Structure (H5)				-0.33 (-0.93)
Constant	3.21 (2.72)	2.17 (1.87)	1.61 (1.30)	0.74 (0.53)
Sample Size	60	60	60	60
R ²	0.22	0.34	0.37	0.42
R ² Δ	0.22†	0.12**	0.03	0.05
F	2.26	3.45	3.02	2.89

Standardized coefficients are reported, with *t-values* in parentheses†*p* < 0.10, **p* < 0.05, ***p* < 0.01

The models in Table 4 were repeated after removing country of origin and after removing gender to determine if removing these variables affected the models. There were no changes in the one-tailed significance outcomes for any of the hypothesized effects after removing these variables.

H2 Result

H2 states that openness moderates the association between event availability and event participation. It was theorized that higher levels of openness in incubator founders would demonstrate a propensity for those incubator founders to participate at events to a higher degree than those that did not demonstrate this trait. This hypothesis was tested in the first regression analysis (see Table 4). The interaction effect between event availability and openness was not a significant predictor of event participation ($\beta = -0.10$, n.s.), indicating that openness did not moderate the association between event availability and event participation, although it was in the predicted direction. H2 was not supported.

The degree to which the trait of openness moderated event availability and participation was not supported in this research, but was described as the second highest category in the qualitative interviews presented later in this paper. While micro traits in this category like intelligence and adventurousness scored high, traits like imaginative, perceptive and an idealist scored lower than many other traits in other categories bringing down this overall number and pulling the openness ratings down as well. While traits like intelligence and adventurousness may align closely with the entrepreneurial journey of founders, they might not have identified themselves as perceptive or idealists as they also generally refer to themselves as constantly seeking more knowledge and improvement.

H3 Result

H3 states that conscientiousness moderates the association between event availability and event participation. It was theorized that higher levels of conscientiousness in an incubator founder might demonstrate a higher propensity to attend available events. This hypothesis was tested in

the first regression analysis (see Table 4). The interaction effect between event availability and conscientiousness showed a modest predictor of event participation ($\beta = 0.43, p < .10$), indicating that conscientiousness did demonstrate a modest level of support for the association between event availability and event participation. H3 showed modest evidence of support.

H4 Result

H4 states that manager role moderates the association between event availability and event participation. It was theorized that the incubator might help facilitate cohort participation at events. This hypothesis was tested in the first regression analysis (see Table 4). The interaction effect between event availability and manager role was a modest predictor of event participation ($\beta = 0.24, p < .10$), indicating that manager role did mildly moderate the association between event availability and event participation. H4 showed modest evidence of support.

H5 Result

H5 states that cohort structure moderates the association between event availability and event participation. The theory here was that a cohort structure model that was competitive in nature might influence more incubator participants to participate in events. This hypothesis was tested in the first regression analysis (see Table 4). The interaction effect between event availability and cohort structure was not a significant predictor of event participation ($\beta = -0.33, n.s.$), indicating that cohort structure did not moderate the association between event availability and event participation. H5 was not supported. To determine if other variables in the model were

impacting this effect, the model was repeated with only event availability and cohort structure predicting event participation. There was no change in the one-tailed significance outcome for the hypothesized moderating effect after removing the other variables.

The challenge in evaluating the cohort structure model is that very few incubators currently employ a competitive cohort structure model. Instead, most opt for a collaborative model choosing to place a higher level of focus on the cohesion of the cohort within the incubator and a focus on ensuring that founders have an enjoyable experience and recommend the experience to others. This assists in drawing additional, new cohort applicants in future years and helps incubator leaders manage the increasing competition levels of attracting the best and brightest cohort candidates to their incubators. As alternative structures like the hybrid model suggested in this research are introduced, it is predicted that this hypothesis would be supported in the future.

H6 Result

H6 states that event participation is positively associated with performance. It was theorized that incubator founders who participated in network events (and other events) would have the ability to apply those learnings to their startups and demonstrate improved performance as a result. This hypothesis was tested in the second regression analysis. The overall model for the second regression model was significant, $F(5, 50) = 2.22, p < .05, R^2 = .18$, indicating that this model did significantly predict performance. Table 5 displays the results for the individual regression coefficients. Event participation was a predictor of performance ($\beta = -0.46, p < .10$). H6 was supported.

H7 Result

H7 states that cohort structure moderates the association between event participation and performance. H7 predicted that the shift to a collaborative structure after cohort event participation would strengthen the incubator-supported startup performance. This hypothesis was tested in the second regression analysis (see Table 5). The interaction effect between event participation and cohort structure was a predictor of performance ($\beta = 0.55, p < .05$), indicating that cohort structure did moderate the association between event participation and performance. H7 was supported.

Table 5

Coefficients for Linear Regression Predicting Performance

Variable	Model 1	Model 2	Model 3
Gender	0.57 (2.04)*	0.52 (1.76)†	0.54 (1.85)†
Country of Origin	-0.34 (-0.97)	-0.34(-0.94)	-0.42 (-1.18)
Cohort Structure	0.74 (1.90)†	0.77 (1.94)†	0.92 (2.30)*
Event Participation (H6)		0.16 (-0.51)	-0.46 (-1.63)
Event Participation x Cohort Structure (H7)			0.55 (1.64)
Constant	2.09 (3.43)	2.45 (2.61)	3.66 (3.09)
Sample Size	60	60	60
R ²	0.13	0.14	0.18
R ² Δ	0.13†	0.01	0.04
F	2.67	2.03	2.22

Standardized coefficients are reported, with *t-values* in parentheses

†*p* < 0.10, **p* < 0.05, ***p* < 0.01

The models in Table 5 were repeated after removing country of origin and after removing gender to determine if removing these variables affected the models. There were no changes in the

one-tailed significance outcomes for any of the hypothesized effects after removing these variables.

H8 Result

H8 states that event participation mediates the relationship between event availability and performance. It was theorized that an increase in the participation at incubator network events would mediate the relationship between the number of network events and performance. The mediation effect was tested by calculating estimates of the indirect effect of event availability on performance through event participation in the second regression. The indirect effects were estimated using 5,000 bootstrapped samples via the PROCESS macro in SPSS with a confidence interval of 95 percent, but the indirect effect was not significant because the 95 percent CI contained zero, $\beta = -.19$, $SE = 0.11$, 95 percent CI = $[-.41, 0.36]$. At a confidence interval of 90 percent with 5,000 bootstrapped samples, the indirect effect showed modest levels of mediation because the 90 percent CI did not contain zero, $\beta = -.19$, $SE = 0.11$, 90 percent CI = $[-.36, -.001]$. The data does show modest evidence for mediation using the PROCESS method.

Using the Baron and Kenny approach to mediation, event availability significantly predicts performance of the startup ($p < .05$), and event availability is significantly correlated with event participation ($p < .001$). The mediator does demonstrate that it mediates the relationship between event availability and performance ($p < .05$). Using this method, H8 is supported. When event availability and event participation are both run to regress on performance, p levels become worse, but event participation holds onto significance.

Summary

A series of regression analyses were conducted to address the hypotheses. The first regression model was conducted to determine if a positive association exists between event availability and event participation, and if manager role, conscientiousness, openness and cohort structure moderate this association. There was a significant positive association between event availability and event participation, supporting H1. While there was not support for event availability and openness nor cohort structure moderating the association between event availability and participation, manager role and conscientiousness did demonstrate modest support in moderate this relationship. The second regression model was conducted to determine if a positive association exists between event participation and performance, and if cohort structure moderates this association. The results showed that there was an association between event participation and performance. The results also show support for event availability predicting performance.

Incubator Leadership Interviews

In addition to the outreach to incubator-supported startup founders directly and to incubator managers to pass along the research, I interviewed incubator or accelerator managers or directors in a series of 22 semi-structured interviews. This is a qualitative part of this study and is reported here as a part of this research. Ideally, these interviews would have been conducted via face-to-face, but because of distance and COVID-19 pandemic restrictions, these interviews were

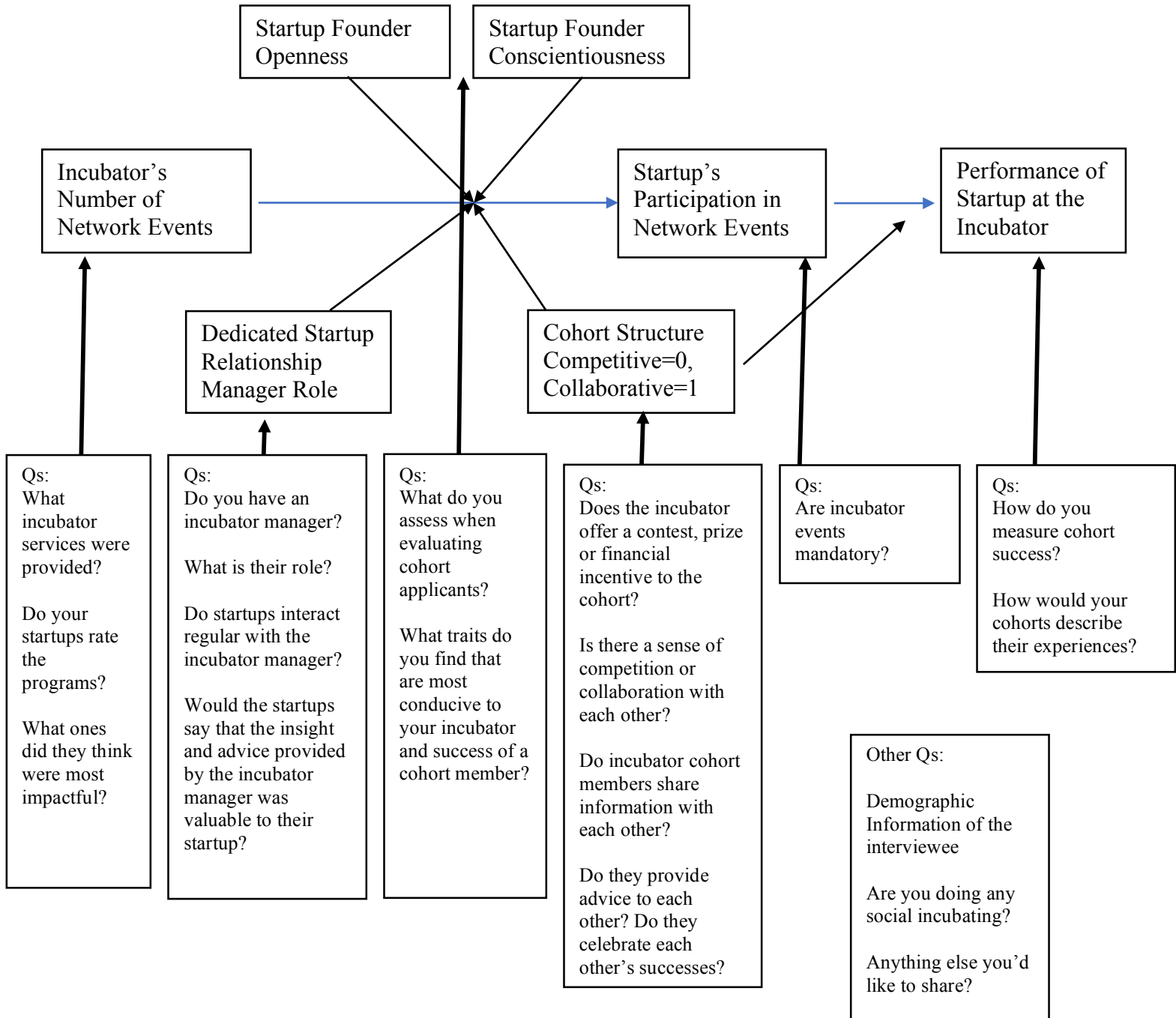
conducted via Zoom. The goal of these interviews was to provide additional insights and observations with a bit more context than could be gathered from the survey instrument alone.

My goal for the interviews was to create a casual, conversation based dialogue with the incubator leader with the goal of gathering their reflections and observations on the questions being asked of the startup founders. The flow of the interviews was to create a safe environment for sharing of these observations, lessons learned, challenges of the incubator director, and to stimulate more dialogue about their incubator structure and performance. When allowed by the interviewee, I recorded the interviews and took notes. In order to complete the similar structure of our startup founder survey, I interjected guiding questions or pressed further on comments made by the interviewee that presented new insights and information.

The basic design of the interview facilitation outline (see Figure 4) is to start by briefly introducing the research by sharing its goals with the interviewee, including the subject area, and scope. This explanation is followed by why the subject matter is important, and how the research will help in understanding the key hypotheses facets of incubator structure and startup outcome. This approach of using interviews to “provide some deep insights into phenomena that we couldn’t obtain without engaging the people who experienced it” is described by Gehman et al. (2017). Teddlie and Tashakkori (2009) and West and Hannafin (2011) also described an interview process to augment quantitative research methods. Observations are shared here, but not measured as part of the startup founder analysis.

Figure 4

Interview Flow



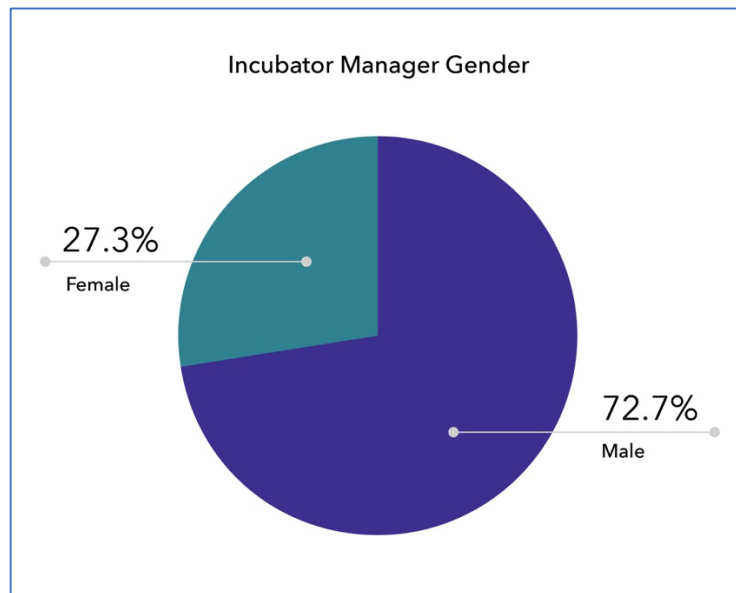
Incubator Leadership Insights

Demographics

From a demographics perspective, 16 interviewees were male and six were female. All had been running their incubators and accelerators as either the incubator manager or director of the incubator for at least five years with the exception of two people, who had been running their incubators for two years. All described the number of incubator cohort graduates or current residents as between 100-500 within the last five years except one, which had about 50 total startups through its program to date. The interviews represented a mix of private, public and university related incubators and accelerators across a mix of industries. One interviewee works solely with corporate incubators looking to attract startups who can help a specific corporation to innovate within their vertical industry. This emerging phenomenon could be another interesting area of future research—particularly around how a corporate-funded incubator should be structured, managed (internally or externally), selection criteria and rewards.

One interviewee described the specific challenges of working for a university incubator model and expressed challenges in structuring support for the cohort members. Rather than bringing in external business specialists, mentors, service providers and advisors for programming, he was required to use academia for cohort advisory sessions and did not feel that this was as successful as it could have been if outside experts were leveraged.

Figure 5



Measurement and Incubator Experience

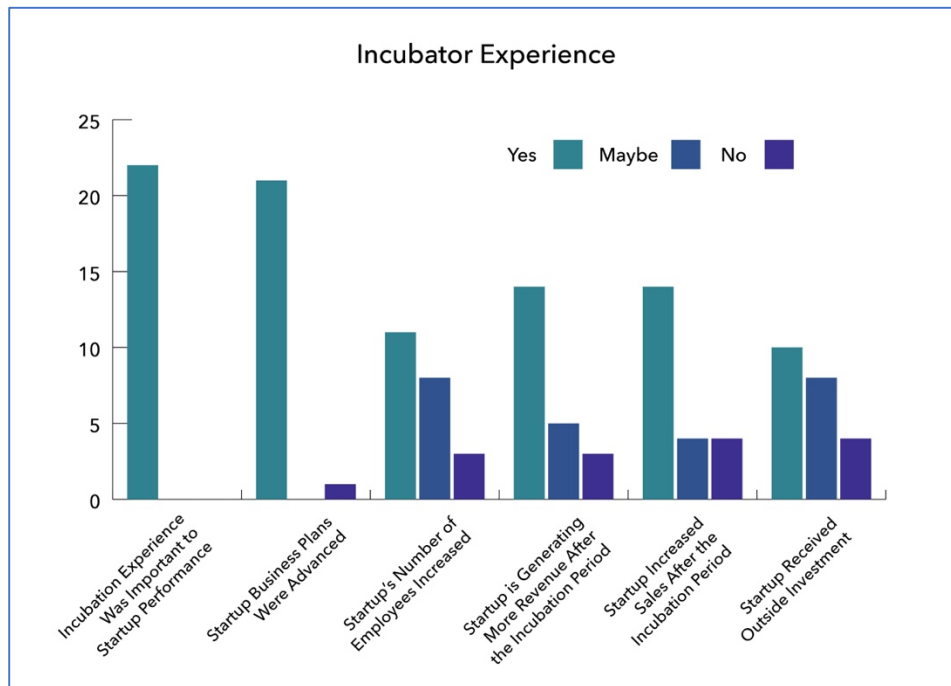
All interviewees described to some degree ongoing challenges in measuring performance of the startup cohorts. Describing the ongoing fight to recruit and retain investors and other grant funding, or to maintain operations, directors are required to survey startup participants frequently to track their progress. All outlined a strong desire to understand what works and does not work to improve startup performance and were very engaged in the research conducted here. Most described ongoing budgetary challenges and a desire to understand from this research if there were any insights around where their money was best allocated to improve startup performance. One director of an incubator described an ongoing debate around programming and if all programming was necessary or if, as described in the hypotheses here, network events should get more time and they should reduce other programming accordingly.

In terms of measuring cohort success, almost all described the standard performance metrics around advancing the business plan, increasing headcount, garnering investment, attracting new customers and sales as key indicators of performance. Only seven of the respondents talked of focusing only on advancing the business plan during the incubation process.

In reviewing how cohorts would describe their experiences, all describe high levels of satisfaction across the incubator process, but also recognize their own biases in this regard. Almost all describe advancement of the business plan ($n = 21$). This was the highest area of response. There was less consistency across other responses for advancements in areas like employee numbers ($n = 11$), revenue generation ($n = 14$) and completed sales ($n = 14$), and received outside investment ($n = 10$) during the incubation period. Where they were not directly tracking progress or seeing process in categories described here, some said they expected that progress against those categories likely occurred later in the startup journey and after the incubation period ended. Ten of the interviewees described cohort members receiving a financial prize or incentive or funding in some manner during the incubation period or as an award at the end of the incubation period.

In many cases, incubator managers and directors described monitoring progress not as a cohort, but as an individual business. They set up a conversation and review of the business plan as part of the intake form and create steps and milestones to achieve that are highly customized to each particular business and their level of business maturity. Measurement is then conducted at the individual startup level to understand if that startup is progressing against its milestones rather than a cohort level series of metrics. One interviewee said that the “system of innovation is so dynamic and the speed of change so fast, we can have a cohort structure, but need more of an adaptive model with reactive muscle.”

Figure 6



Evaluating Cohort Applicants

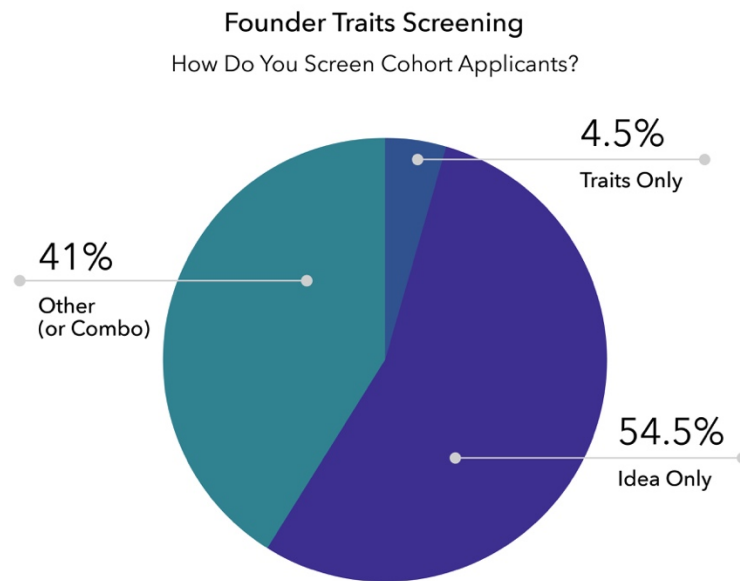
More than half of the interviewees ($n = 12$) explained that they judge ideas alone when evaluating applicants for their cohorts. Only one interviewee said that they evaluated traits only when interviewing candidates. The remaining nine described factors like their ability to assist the business, whether the applicant demonstrated an acceptable level of research, whether the business was scalable, and whether the founder is “coachability” as key factors in the decision making. Almost all described this area of coachability as the most critical component of selection, but could not describe specifically what those traits were and did not leverage an assessment tool to assess traits they deemed aligned with their impression of someone’s coachability. A few incubator managers described a desire to identify cohort members who would get along with each other and create a good team feeling within the cohort as a primary selection criteria. There is a great deal

of interest among interviewees around formalizing an assessment tool that could evaluate coachability or for this research—openness and conscientiousness—to better understand these founder traits.

Another interviewee said that while not something they could say publicly, they believe that as “founder age increases, coachability decreases.” Whether by design or not, their typical founder age is 35 years or less. One interviewee said that he was less concerned about personality traits and just wanted to see that a startup founder had, “advanced their idea with a prototype, minimum viable product and full business model plan ready to go.”

Another area that came up in the interview process was the evaluation criteria around startup founder participant availability. Six of the interviewees described the need to evaluate the startup teams’ ability to participate and be available fully for all programming as a critical factor in evaluating their candidacy for the cohort. When pressed, they described previous challenges with cohort members who had full-time jobs or other responsibilities that kept them from participating fully in the incubator process. One interviewee described an experience where he had to kick one of the cohort members out of the group after missing the third meeting in a row. He said it was, “incredibly frustrating given that we’d rejected other candidates to make room for this cohort member.”

Figure 7



Incubator Manager Presence

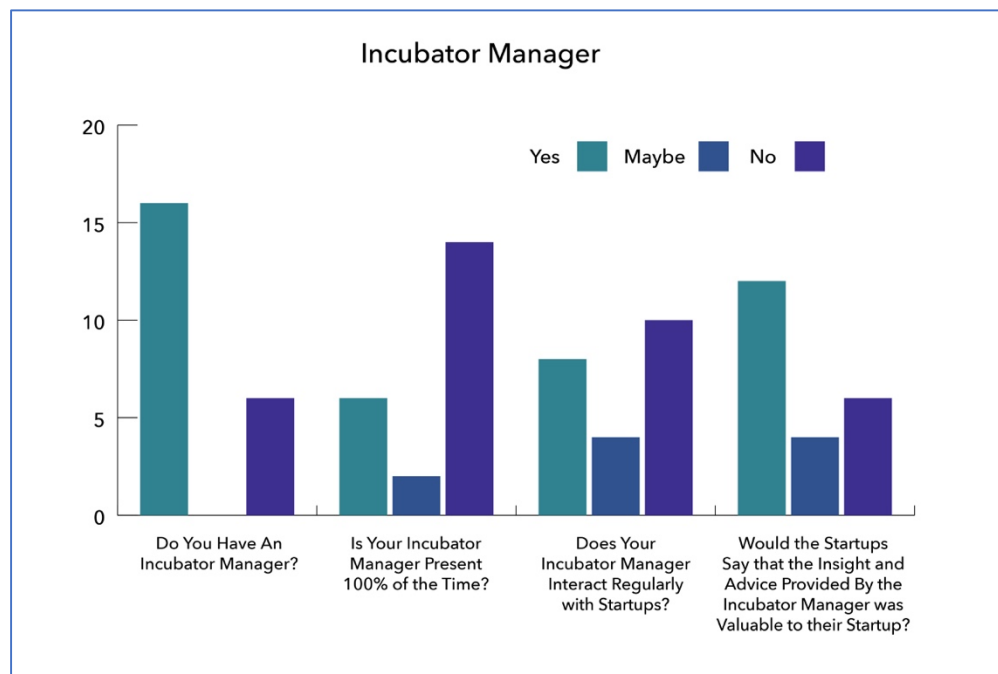
Interestingly, while these interviews were conducted with directors or incubator managers, only one described their role as a full-time incubator manager. Sixteen interviewees said that they had an incubator manager, but of those 16, only six described the incubator manager as being present 100 percent of the time within the incubator with the role of providing advice and guidance with regularity to the cohorts. Instead, most described their incubator manager as being part-time, more administrative, more focused on data collection, and doing some coaching and advisory work for the cohort members. One interviewee said, “Yes, the incubator manager is there to support the cohorts, but they’re also the CEO of the incubator and need to run that business too.”

One interviewee described the primary function of the incubator manager not to provide advice and guidance to the cohort members, but instead to be the “facilitator of the Five Cs—

creativity, connections, capital, coffee and craft beer.” Another described their incubator approach as “low pressure”—focused on casual check-ins with regular meetings to guide accountability. Of the respondents, 14 said they did not have a full-time manager present and two said sometimes they did. Of the 22 interviewees, only eight said their incubator manager interacted regularly with startups. Typically, they described spending time on coordinating research, preparing programming, services and other incubator management administrative details.

Half of the interviewees felt that startups would say the feedback they received was valuable. This could be either because they simply are not receiving it or because it is not their primary role. Some described this as a “maybe” because they were not sure what the startups would say when asked this question.

Figure 8

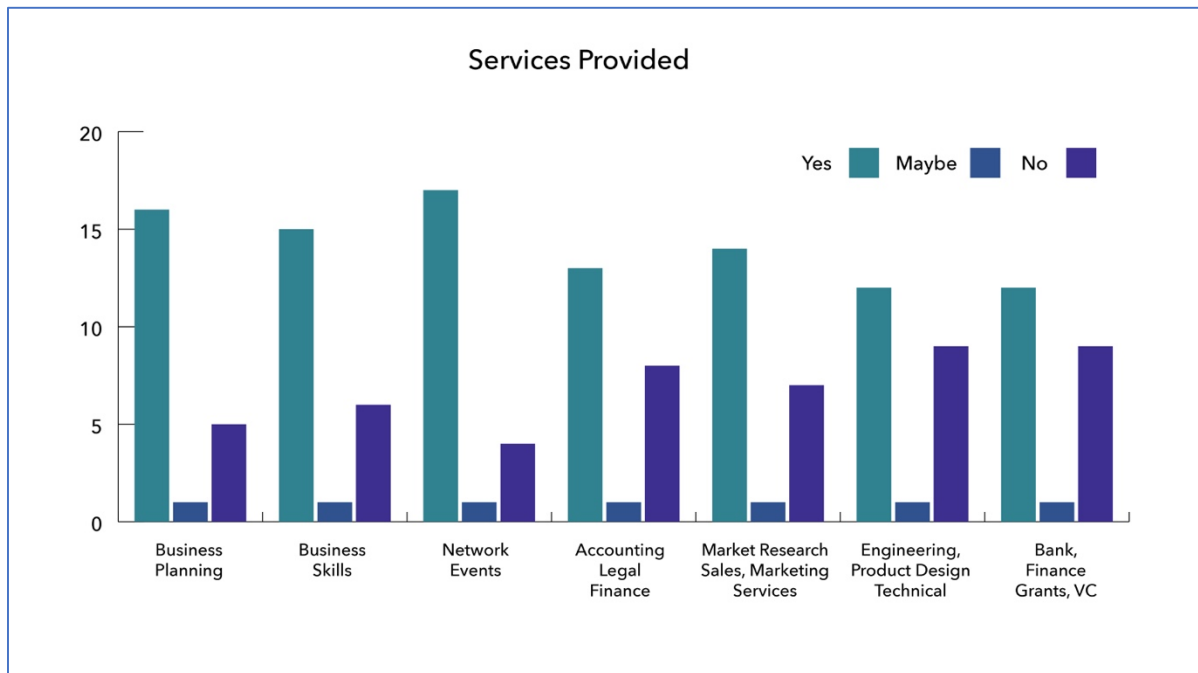


Incubator Services Provided

It is fairly common practice across all incubators to offer a variety of programming across all categories in our survey—business planning; business skills; networking events; accounting, legal or financial services; marketing research, sales and marketing; engineering, product design or technical services; financing, grants and venture capital services. There was a great deal of debate across interviewees around which were the most effective, and it was largely dependent on the stage of business and maturity of the startup venture. Those that were considered the most impactful were networking events ($n = 17$), business planning ($n = 16$), and business skills ($n = 15$). One interviewee said that networking events were the most critical because they “create connections through topical happy hours and both formal and informal introductions to investors, customers and service providers.” All described the desire to attract and retain more funding opportunities and investors for their startups as they understood that this is a primary driver to attract startups to their incubators in a highly competitive environment.

While many of the incubator programs interviewed generally coalesce around larger cities in urban areas, a group of incubator directors from the mid-west participated in the interview process and described a different challenge. They felt as though they could attract and retain great startups, but they did not have the quality of subject matter experts and speakers to create a robust programming structure for their cohorts. During our interview, we spoke about their need to partner with others to develop programming that would assist their startups with a more sophisticated level of knowledge around key topics, as well as driving connections through networking events with customers, partners, mentors, and investors in other markets where funding opportunities are more readily available. This area of “big city bias” and the challenges impacting more rural incubator networks could be a good opportunity for future research.

Figure 9



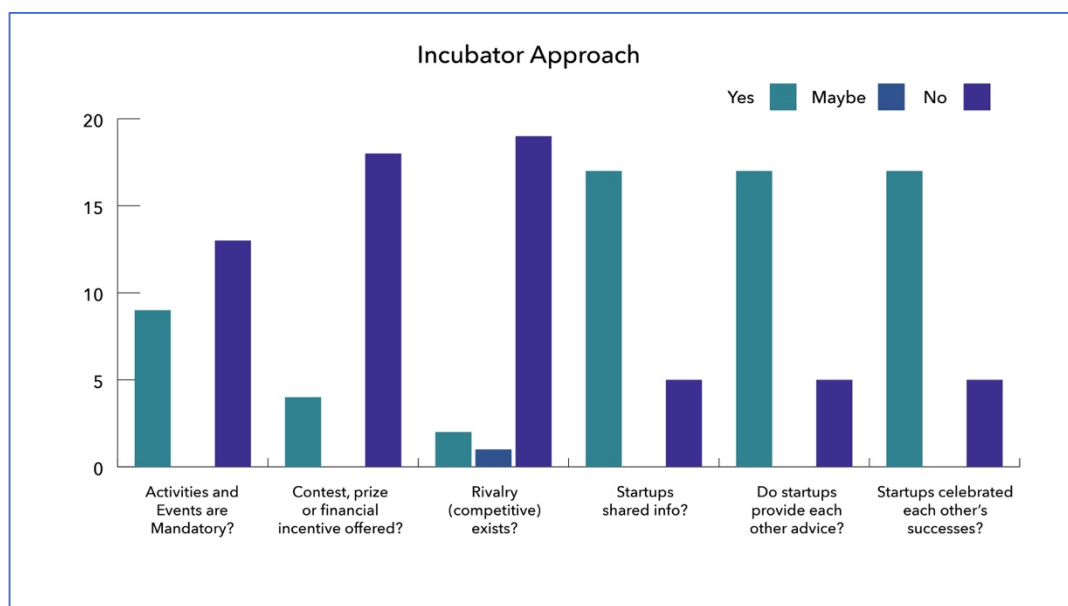
Incubator Approach

There is a significant difference around incubator approach across all interviewees. Some described making events mandatory ($n = 9$) and some feel that this is the wrong approach because startup founders might not feel ready for the programming at the stage they are at in their business. Thirteen interviewees said that their programs were not mandatory. While four incubators described having a cash prize, all described their incubators as collaborative where information is shared across startups, they are providing advice to each other and celebrating each other's success. Many described the cohort structure and close proximity at the physical incubator space as being a critical driver in the collaborative approach because cohort members spend so much physical time together in that space, some described this need for positive culture and collaboration as critical. Others felt that the nature of their more personalized, customized, non-cohort driven

incubation structure does not require collaboration. It was also noted by a couple of interviewees that collaboration or competition (or a focus on cohort culture at all) was less critical as their cohorts have had to move to a virtual incubator format during the pandemic.

There was also some discussion among interviewees around incubator length—another interesting area for future research. One incubator director described a “no end date / no cohort” approach to incubator whereby the startup founder can remain as long as they are progressing their business plan. When pressed, he did explain that this is challenging from a budgeting and also from a measurement and metrics perspective because one of their metrics is graduation rate and some of the startups linger for an average of five to eight years.

Figure 10



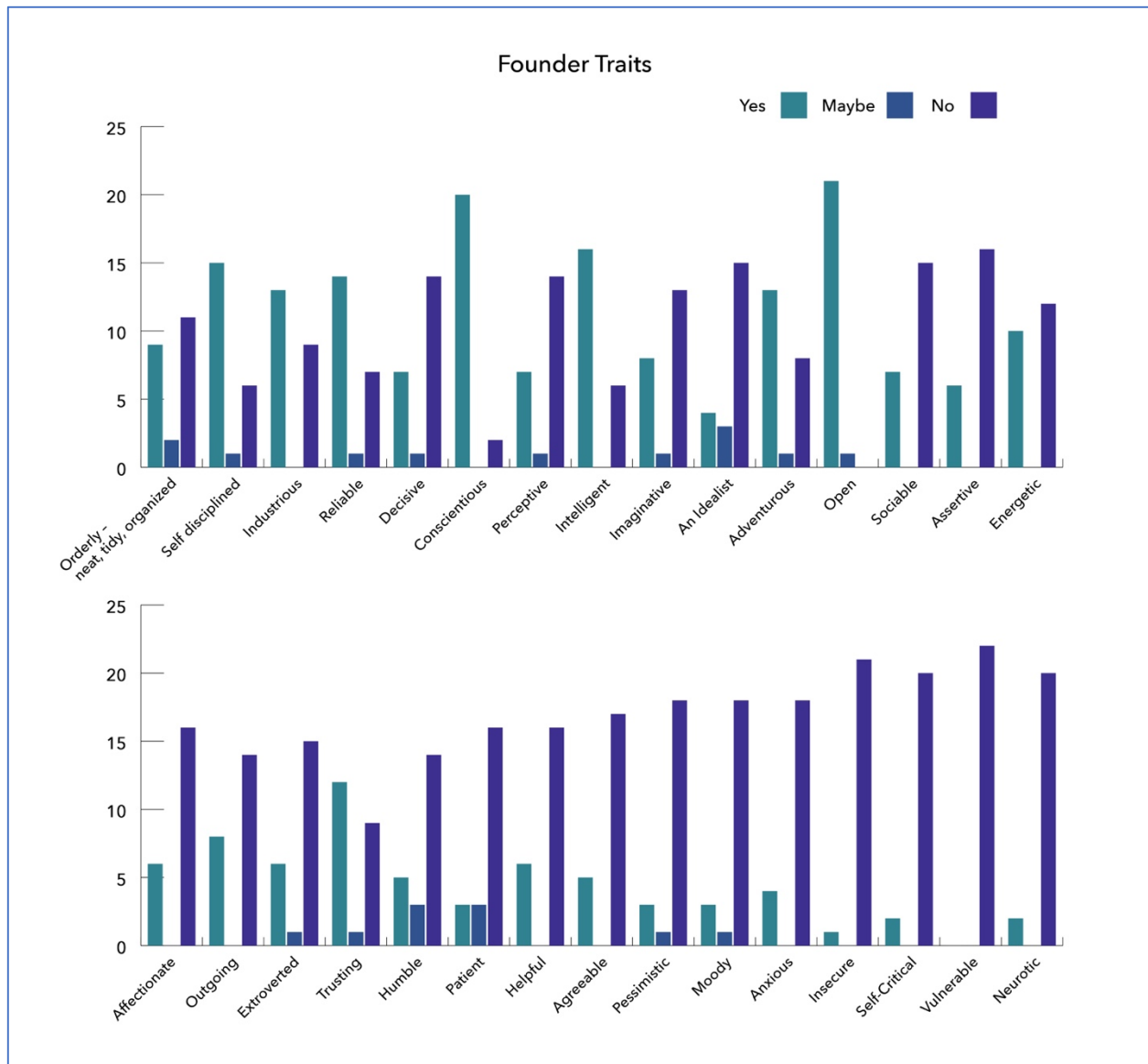
Traits

Founder traits were varied, but almost all described their cohorts as exhibiting openness and conscientiousness. Conscientiousness traits that were pulled from the research of Saucier and Ostendorf's (1999) exploration of conscientiousness facets were listed along with the word conscientiousness, including orderliness, industriousness, reliability, decisiveness and perceptiveness. I added Soto and John's (2008) self-discipline category to the conscientiousness category as well. The category of conscientiousness scored the highest overall with a total yes count of 78 of the possible 132 answers. More specifically, conscientiousness was the highest scorer with 20 yes answers followed by self-disciplined ($n = 15$), reliable ($n = 14$), industrious ($n = 13$), orderly ($n = 9$), and decisive ($n = 7$).

The next highest category were the traits to describe openness with 69 total yes answers out of a total of 132 possible responses. For openness, in addition to including the word open, I also included the John and Srivastava (1999) traits of intelligent, imaginative, perceptive and the Soto and John (2008) traits of idealism and adventurousness to describe openness. Among these responses, open scored the highest with 21 answers of yes. After that, the next highest scoring traits included intelligent ($n = 16$), adventurous ($n = 13$), imaginative ($n = 8$), perceptive ($n = 7$), and an idealist ($n = 4$).

Across all categories, the highest scoring traits included conscientious ($n = 20$), open ($n = 21$), intelligent ($n = 16$), self-disciplined ($n = 15$) and reliable ($n = 14$). Depending on the nature of the incubator, some described a more sociable, extraverted and energetic cohort structure while others described having more technology and engineering focused founders who generally were not as extraverted.

Figure 11



Limitations of Study

As I proceeded with this study, a number of limitations were apparent and some were noted in the course of this dissertation. These limitations are reviewed in more detail here and will ultimately assist in the opportunities for future research.

The sample itself was limited to public lists of incubators and their startups, as well as those identified through social media and the researcher's own business network. While every attempt was made to reach out beyond existing networks to ensure adequate representation across the US and Canada and from incubators and accelerators of all sizes and types, some limitations may exist. Since this was largely a convenience sample, despite efforts to expand through leveraging paid media and broad outreach to the incubators across the US and Canada, some limitations may exist in representation. An attempt was made to offset any startup limitations or larger city bias by reaching out to many smaller city, central US and Canadian incubator locations.

In terms of sample size, while every effort was made to engage with startups directly, I also engaged with the incubators around the US and Canada to request that they share the research with their cohorts. In some cases, there was a resistance or hesitancy to facilitate the sharing of the survey because incubator managers felt as though the cohorts were already over-surveyed given the incubator's need to provide detailed data about their former cohort's performance at regular intervals in order to maintain funding. There was also an expressed concern that founders at startups are already overwhelmed and inundated with work to do as a function of their leadership, the time they invest in their businesses already, and the demanding nature of startup founder roles. There was also some hesitancy relating to the sharing of startup founder emails, which was overcome by sharing an anonymous link to the incubator. Again, this then removed the ability to control the dissemination of the survey link or the ability to send out reminders to complete.

Lastly, there was a concern from the incubator managers that they had not been as connected with their current and previous cohorts as a result of the COVID-19 pandemic. Almost all had been fully virtual and not connected in-person for more than a year by the time the research

was conducted and may have resulted in fewer responses than if the cohorts were still connected and within the same physical workspace. Incubator managers felt that if they had still been in-person with their cohort members, they would have a better ability to share the research link and encourage participation. In addition, this research didn't take into account the maturity of the incubator and the evolution of its services and offerings, although I did ask the incubator managers anecdotally how many startups they have graduated from their programs.

As I monitored the return rates and completion of the study, I also identified that the length of the study and complexity of the Likert scale study on mobile devices in particular might have made it more challenging and time consuming to complete. This may be the reason for the larger number of incomplete surveys that were not included in this research. Almost half of the responses to the survey showed as incomplete (i.e., 45 – progress score of 0 – no questions answered; 10 – performance only; 6 some partial responses throughout).

As noted in Sherman and Chappel's research (1998), it is recognized that firms entered into these incubators at different times with different economic implications which could impact the results of the comparison. I also did not take into account the structure of the startup as it entered or exited the cohort, and the role that the startup founders' existing personal network and contacts played in its overall success as well.

Finally, from an analysis perspective, some criticisms of mediation measurement should be noted. While mediation is considered a useful and effective statistical analysis tool, it can be used improperly. For this research, I made sure that the measures used to assess the mediator and the dependent variable were distinct, and that the independent variable and mediator would not interact. The goal was to make the mediation as clear as possible to ascertain.

Chapter 5

Discussion and Conclusion: Potential Contributions and Avenues for Future Research

The scope of this study included both startup founder teams who participated in an incubator or accelerator cohort, as well as incubator and accelerator managers. I have been personally energized by the interest in this research and the level of responsiveness within the incubator networks. There is great pressure on incubator and accelerator managers to continuously improve their programs and structure them to drive greater startup outcome. Often, this pressure is coming from funding entities, and incubators and accelerators must fight for continued funding streams and other resources. Other times, they are feeling budget pressure or the need to attract and retain the best startup founders in an increasingly competitive landscape. The level of interest is very high from these individuals, and there are a number of requests for an executive summary of these findings or presentations at upcoming incubator and accelerator network and association events.

Incubator Implications

Given that the number of incubator and accelerator organizations continues to steadily rise since the 1980s, increased competition for funding, mentors and other programming expertise, and to attract and retain the best startups adds additional pressure on incubator managers. As the research bears out, nearly 87 percent of incubator-supported startups survive after five years vs. 44 percent according to The National Business Incubator Association (2018). Even more

appealing for communities looking to improve their economic development, generate more revenue for their state or municipality, and inject innovation in their workforce is the fact that 84 percent of incubated startups stay where they are incubated (Smith, 2011).

With increased competition for startup founder attention, incubators are struggling to remain competitive and to understand how their valuable resources can be best spent to attract, retain and graduate the best and brightest startups. They are also feeling pressure to demonstrate where their budget spend is best allocated to improve startup performance outcomes. While scholars have addressed the effectiveness of incubators in driving better outcomes for startup survivability, they have not previously examined areas like incubator characteristics, startup founder personality traits, and the nature of the interactions between incubators and startups to see how they bring about better outcomes. As a result, the startup community is left with open questions regarding the effects that the characteristics of the incubator and certain personality traits of the startup founders, and the combined effects of both have on incubator-supported startup performance. This research provides some additional guidance for these incubator managers.

Critical components for incubator managers to consider, include the following areas:

Selection Shifts

Startup cohort participants are routinely selected into an incubator based on their idea -- whether it has merit or whether the incubator feels like they have enough expertise to support the startup's idea. Based on the research of Barrick and Mount (1991) and the Big-Five Model (Costa and McCrae, 1992; Digman, 1990; Goldberg, 1990; John et al., 2008; Rauch, 2014), we know that two personality traits—namely *openness* to experience (i.e., the “breadth, depth, originality and complexity of an individual’s mental and experiential life”) and *conscientiousness* (i.e., the

“socially prescribed impulse control that facilitates task-and goal-orientated behavior”)—have been found to be more prevalent in entrepreneurs than in other individuals (Zhao and Seibert, 2006). I evaluated these personality traits in determining what approach to use to drive an increased level of startup participation in network events. This research does identify that the ability to screen for openness and consciousness in founder personality traits may indicate an enhanced level of engagement and application of learnings from incubator programming to the startup’s business and improve the startup’s performance. Respondents and interviewees are describing these characteristics as present or as the ability to be “coachable” and more formality around defining these and screening for them should be undertaken.

It is not enough to have a great idea and engagement from the founder if the founder’s personality traits will not allow for the type of participation and the application of the newly learned knowledge back to their startup venture. Research shows that assessing the Big-Five Model of personality traits (i.e. Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism) can give us important indications about a founder's ability to be successful in an incubator. I recommend that in addition to screening for the business idea, early stage business plan details, coachability, and the ability for the incubator and its mentors to add value, that the incubator also screen for the presence of openness and consciousness traits in the startup founder team.

In addition to personality traits, I recommend that the incubator screens the startup founders on the area of engagement. Incubator managers interviewed for this research reported that startups are selected for their idea, but then they find out that the founder has a full-time job or is generally not available for critical components of the incubator’s programming. In order to facilitate successful engagement in the incubator and enhance the ability to apply those learnings to the

startup founder's business, attendance should be mandatory. Confirmation that the founder has the ability to stay focused, engaged and committed to the process will be critical. In fact, this level of engagement is so important, that I would recommend shorter incubation periods (e.g. 4 months vs. the traditional 6-9 months) in order to ensure that the engagement can be sustained.

Programming Potential

There is little diversity in the types of programming offered by the incubators studied for this research. All appear to offer the same traditional business planning, accounting and finance, leadership and HR, marketing and sales, product, and investor funding sessions. Many employ informal networking events and activities to create connections between the startup founders and mentors, potential customers and investors. A few studies have reviewed network service offerings as a component of the services offered by incubators and have pointed to their importance as a contributor to startup success. These studies found that facilitating informal business networking (Weinberg et al., 2013) and connections with internal support functions (Patton et al., 2009) contribute, in part, to successful outcomes for startups. This dissertation examined the extent to which the incubators in the study offer network events and whether greater participation in the network events yields greater incubator-supported startup performance.

This study used performance metrics from previous studies as the basis for measuring the performance of startups, but the fundamental difference between previous studies and this study is that here the focus was on a specific service—network events—and the impact that driving greater participation in these events might have on startup performance.

This research found that programming, especially network events, is an important place to invest spending. While the business incubator should continue to have training programs across

leadership, finance, legal, marketing, sales, product design and more, the most important component of the programming roster should be the quality and number of network services and network events offered as demonstrated in Hypothesis 1. These events typically bring startup founders together with mentors, customers, advisors, potential investors and more. Those incubators with better networking events and services will likely generate better results from their startups.

Incubator Manager Mandate

Within the research and the interviews, the variability of the incubator manager role is high. While some incubators do have an incubator manager serving an advisory role, many are part time roles and lacking the expertise needed to provide feedback and guidance on a regular basis. Often, incubator managers provide a basic administrative role managing a front desk, technology support, coordinating programming and managing the day-to-day issues of the running of the incubator.

According to this research and the anecdotal feedback from the startups and incubator managers I engaged with during the process, the regular presence and advice of an incubator manager of the startup could be important. Great selection criteria and programming need to be coupled with a dedicated support resource for the startups within the incubator. Far too often, we see no incubator manager exists at all or only a part-time incubator manager is present. Cutting back on the incubator manager role or having a dual-purpose incubator manager and reception desk administrator gives you efficiency at the cost of effectiveness. The incubator manager role is a critical component to overall incubator and startup success. Serving as the incubator operator, as well as a mentor and advisor to the startups is critical. The incubator manager should be monitoring

and setting expectations for participation, reporting outcomes for the startups, and intervening when necessary.

During the research process, I found that incubators that reported full-time incubator managers, seemed to employ academics or previous entrepreneurs in residence to provide valuable insights and advice to the startups, and that the most value from those discussions happened not at scheduled times, but more frequently and informally within the incubator setting.

Another critical role of a seasoned incubator manager is in managing the culture of the incubator, and the role that the incubator manager plays in encouraging startups to participate in the valuable programming that is available to them.

Culture Configurations

Within this research, I explored social exchange theory to help understand the exchange of information and insights between two parties—in this case, incubators and startups and startups with each other. Social exchange theory and social network effects show that incubators can assist startups by encouraging them to participate in network events and by developing content for interrelationships among the cohort (Scillitoe and Chakrabarti, 2010; Rubin et al., 2015; Weinberg et al., 2013). Research has found that the most important aspect of the incubator-startup relationship is not the development of the networking events, but the reciprocity of the social exchanges at the events (Cropanzano, 2005). Numerous conceptual papers have discussed various aspects of social networks, including the existence and impact of tension within the networks, and the importance of trust in the social exchange and its role in driving greater positive exchange outcomes (Honig and Davidsson, 2000; Konovsky, 1994; Lambe, 2001). Other research has

addressed the role of emotions (Lawler, 2001) and power and status conditions (Lawler, 1999) in the exchanges.

I took a different point of view on social exchange in that I explored competitive versus collaborative environments and their impacts on startups participating in network events (competitive) and on sharing and being mutually supportive (collaborative). I also looked at the role these environments can play in creating more positive outcomes for startup performance. While my empirical research did not find that the social dynamics of personal and professional networking activity within incubators is important for the success of the startups, interviewees did describe this as a critical component of programming. This finding indicates that incubators should serve as hubs for networking activities (Bollingtoft and Ulhøi, 2005).

In this research, I focused on the moderating effects of a competitive versus collaborative culture and cohort structures within incubators. There is research that outlines the organizational benefits of knowledge sharing (Patton et al., 2009) and the impact of a positive culture on startup success (Bollingtoft, 2012; Tötterman and Sten, 2005) pointing to the importance of a collaborative cohort. A deeper understanding of the impact of adopting a combination of a competitive and collaborative culture that delivers greater startup success was necessary to developing a model for incubators.

Typically, in the incubator setting, there are two types of incubator culture—either competitive or collaborative. In a competitive setting, the cohort members contest for advisory time, resources, and pitch competitions and individual startups fight to win financial rewards. In a collaborative setting, the cohort is tightly bonded with group learning and support, brainstorming, and sharing resources and leads; individuals are generally supportive of each other. I believe that a combination approach to incubator culture is the most effective. For example, designing a

competitive framework for the startups to participate in the programming events fuels critical participation. Then, after the programming, adjusting to a more collaborative framework creates a supportive environment for the application of programming-specific learning in the incubator. Startups should assess the cultural environment at the incubator to understand if they can be successful there, and the incubator manager's full-time presence would assist greatly in managing that hybrid cohort culture model. This approach is outlined in the incubator model presented in Figure 12.

It is an extraordinary time for startup innovation and the business incubator model is very effective at cultivating successful innovation. With increased scrutiny and a higher number of options for startups, incubators must themselves keep innovating to ensure they are staying competitive and creating an operating model that drives the greatest startup success. Evaluating selection criteria, ensuring an incubator manager is available at all times for guidance, ensuring network event access, and facilitating a hybrid cohort culture structure that drives startups to the programming in a competitive (or “gamified”) way whereby they could receive additional advisory hours or a small funding incentive will drive greater participation and then switching to a collaborative model will still provide the type of shared learning and support necessary for improved outcomes.

Theoretical Contributions

As discussed earlier, the research on the relationship between startup business cohort members and their incubator and the relationship among the cohort members are important dynamics in driving successful startup outcomes within the incubator network is inconclusive.

Although this dissertation does not claim to have all of the answers to an optimal model for startup management within an incubator cohort, it does begin to outline how incubators can structure components of their models to begin adopting an approach that might influence startup performance. On a theoretical basis, this research has explored elements of a number of different pieces of literature to inform that the practical advice laid out here to inform business incubators about those considerations. This included an application of previous literature findings in the areas of the use of business incubators to drive better outcomes, characteristics of startup founders, the role of the incubator manager, network events and the competitive and collaborative experiences of startups within their social exchanges.

The model presented in this study is a new contribution to theory, bringing together the literature on business incubators, psychology and the Big-Five and social exchange to contribute to existing literature in all areas. The dissertation can serve as a starting point to create and test additional cohort structure and exchange models to see if they can further strengthen startup performance. As indicated, all attributes in the study were given equal weighting and additional areas like non-network event programming and additional Big-Five personality traits were included for exploration. Moreover, individual incubator manager and incubator executive director interviews were conducted to enrich the data collection and uncover other anecdotal feedback around challenges in business incubation and framework development already underway. All of the data suggests avenues for follow on studies that will continue to advance theory.

Where previous literature has focused on areas of research like the physical attributes of the incubator including its facility; the relationship of the incubator to the community; the type of funding it receives; and the relationship it has with the local government (Campell and Allen, 1987; Hackett and Dilts, 2004; Phan et al., 2005; Mian et al., 2016; Ribeiro-Soriano, 2016), this research

was focused on and advances the development of best practices in running the incubators so as to generate the greatest chances of successful outcomes.

The study suggests that the incubation process does add value by accelerating the growth of startup businesses and identifying ways for them to maximize their potential for success. The data shows that the incubation process assists with the progression of the business plan, creation of jobs and attracts customers and investors. This supports the literature by Adkins (2001), Scheirer (1985), Bowman-Upton (1989); and Hackett and Dilts (2004) that signaled that the structure and management practices of incubators to drive greater startup success and provides additional support for the ways that it contributes to success.

In the anecdotal interview of the 22 incubator managers and directors conducted for this research, respondents described a primary driver of incubator cohort performances was the impact it would have on the economic development of the community. With research indicating that 84 percent of incubated startups stay where they are incubated (Smith, 2011), incubator managers were very focused on generating strong performance outcomes from the incubated startups and keeping them in their communities to drive economic development, infuse innovation into their communities and create jobs. This anecdotal interview feedback supports the previous research that evaluated the structure of incubators and their impact on the community's economic development (Markley and McNamara, 1995; Mian et al., 2016).

Cohort Selection

Previous research explored the role of various characteristics of startups and their founders to explain the success of the startups (Bartik, 1989; Doutriaux, 1992; Wagner and Sternberg, 2004; Hanson, 2009). Where Doutriaux (1992) began to outline the personality traits helpful in driving

better startup performance, this research extended that research in tying the personality traits of the founders and their ability to be open to the learnings of the incubator and then apply those learnings to their businesses. This research extended the existing Five Factor Personality Model (Thurstone, 1933; Goldberg, 1993) to explore startup founders' personality traits as the primary determinant of participation in network events and, in turn, the ability and willingness of the founders to incorporate the learnings in their businesses.

Other research had found that entrepreneurs are consistently more open to new experiences than are managers and that they have a higher conscientiousness level than managers. Therefore, I focused on these two parts of the Big-Five personality domains—conscientiousness and openness (John and Srivastava, 1999; John and Naumann, 2007). In this study, I looked at the OCEAN of Personality explanation of the Big-Five Domains as outlined by John and Srivastava (1999) to explore and extend the literature on the role that the characteristics of startup founders might have on their drive to participate in network events and to apply the learnings to their businesses. When exploring the presence of the Big-Five trait of conscientiousness as defined as “socially prescribed impulse control that facilitates task and goal-oriented behaviors” (John and Srivastava, 1999) and conscientiousness as defined as “achievement motivation and dependability,” this research extends the theory that ties the presence of openness and conscientiousness to a positive association related to startup performance and may even begin to define the incubator director “coachability” term that many referenced in our conversations.

The findings of this research indicate that screening for the traits associated with conscientiousness and openness, when applied to a founder-led business, increase the likelihood of success for the startup. Also screening for traits like orderliness, self-discipline, and industriousness, when applied to a startup and the services available to it, may drive greater

participation in network events and an increased chance of the learnings from the events being applied to business challenges.

Programming

This dissertation found that there is a strong desire by incubator managers to identify differentiators to drive attraction of strong startups and to improve outcomes. Where previous literature again identified that all incubators are not created equal (Rice, 2002; Bergek and Norman, 2008; McAdam and McAdam, 2008; Hackett and Dilts, 2004; Aaboen, 2009), it fell short of mapping out the key characteristics of the incubator offerings that motivate startups to participate in network activities. In fact, in a Malan and Hammarlund (2002) study, the nature and range of business support services were found to vary greatly by incubator. They found that of the 15 incubators that they studied, networking of startups founders with other entrepreneurs and customers was only offered by five percent of them. Their study discussed the importance of encouraging networking between the startups within the incubators and found that it is common for business relationships to develop among the startups. They observed that internal networking encouraged by the incubators is critical for the sharing of information, ideas, and advice.

Isabelle (2013) found that a crucial component of the services that incubators offer is an extensive network of advisors, entrepreneurs in residence, partners, and service providers that complement the business assistance programs that incubator managers provide to entrepreneurs. Isabelle recommended that startups seek a strong network event framework in an incubator, which would help them learn, grow, and potentially connect to additional sources of information, revenue generating activity, and ultimately funding. While Isabelle posits that a strong network event framework is critical to success, her research falls short of identifying how such a framework could

be facilitated and encouraged within the incubator. This dissertation sought to evaluate this further by understanding general availability of network events (the highest number – see Figure 9) how an incubator might drive startups to higher participation levels in programming.

While this dissertation identified that there is little differentiation amongst programming offerings, it does extend the research around shared services to point out specific types of program offerings and the receptivity of startups to attend, and whether they felt it was valuable to their startup. Previous research focused on business planning, accounting, marketing, computer training, legal services, and government procurement where this research extended that list to include additional services and a heavier emphasis on networking events. This dissertation also supported the Nowak and Grantham (2000) study that outlined how access to networks and network events helps business incubators assist startups to overcome their inherent scarcity of resources.

With the goal of identifying if there were particular programs that were more valuable to the success of incubators and new business creation, this dissertation advanced the existing literature by determining that the network events—connecting startup founders with potential customers, mentors and investors—was the most valuable of all of the programming offered. Where previous research recognized that networking events were an important factor in driving startup success, they only measured the presence of these events as part of the structure of the incubator. This research extends the Isabelle (2013) research by reviewing the number of events, the support the events receive at the participation level, and their perceived impact on the success of the business by the startup founder.

The Role of the Incubator Manager

This research evaluated the role of the incubator manager and extended the theory around the incubator manager's role in both provided advice to the startups, encouraging active participation in the programming, particularly the network events, and establishing and enforcing a cohort culture.

To the extent the incubator manager's role is seen as being an alliance partner to the startup cohort, an alliance with the manager can create interfirm trust. This dissertation supports the research of Das and Teng (1998) that said that trust plays a critical role in the support structure needed for the startup to perform better. When efforts were taken to formalize the role of the incubator manager and that incubator manager had regular interactions with the startups to provide advice and guidance, startups felt they performed better in addition to having a more positive startup experience. This further supports the research of Rice (2002) on the adoption of a business-like approach to running incubators and monitoring startups as being critical to the performance and best practices of incubators. It also confirms the findings of Malan and Hammarlund (2002) where there were limited incubator managers spending time providing advice and direction to their startup clients. The research identified that when there is a dedicated manager providing advice and guidance, and focused on alliance relationships as outlined in Kale, Dyer and Singh (2001) and Rice (2002), there is the potential for improved startup performance outcomes. This research, in both the data and the anecdotal interviews, found disparity in the roles of the incubator manager. Similar to the 2005 study by Bollingtoft and Ulhoi, this research also found that most incubators have incubator managers who serve administrative purposes and many lacked the type of experience necessary to adequately guide the startups. This supports the previous research by The Organization of Economic Cooperation and Development (OECD) (2010) that found that the

greater the quality of incubator managers, as reflected by their business expertise and their past work experience, the greater the contributions they can make to the success of technology incubators.

While existing research further indicates that the interaction between the incubator manager and the startups is an important indicator of success, it focuses more on advisory services provided and less on the encouragement or mandating of participation in incubator activities. Existing research does not address the speed with which alliances need to be created to have an impact on the cohort given the cohort's limited time within the incubator. Within this dissertation, I explored how the incubator manager plays an important role in encouraging startups to participate in networking events, which results in better performance outcomes. The role of the incubator manager in creating a hybrid model of culture—both in encouraging a competitive culture framework to drive program participation and then to create a collaborative culture framework to allow for greater support and collaboration at the end of the incubation period between startups—is a new contribution to the literature.

Social Exchange and the Network Effect

This dissertation extends social exchange literature as it seeks to determine how the linkage and exchange between the characteristics of the founder and the incubator and its manager would further improve participation within the network events and ultimately startup success. The social exchange characteristics contribute to startup success over and above the startup characteristics and the incubator characteristics.

This dissertation confirms the research of Heide and John (1992) and Lambe et al. (2001) where they described business-to-business exchanges as relying heavily on relational contracts or

norms to govern the exchange process. It also anecdotally confirms the findings of Dirks and Ferrin (2002), which found that when a relationship between trusted parties exists within an incubator, one would expect a largely favorable outcome because the exchange would benefit both parties through a collaborative construct (Dirks and Ferrin, 2002).

This dissertation continues the research of Pangarkar (2003) and Rahman and Korn (2014) who explored short-term alliances and their potential to produce less satisfactory outcomes than longer-term alliances where complementary and more extensive collaboration may produce successful outcomes. This dissertation establishes that developing effective, long-term alliances is particularly challenging in the incubator structure given that the timeframe for a startup to be a member of an incubator cohort and to leverage the resources of the incubator is limited. Assisting with personality trait screening, and functional support elements of the incubator, along with proper support of a skilled incubator manager are critical to supporting the quick and effective establishment of alliances that will have a positive impact.

Cohort Structure: Competition vs. Collaboration

Existing research is split on whether incubators should facilitate a competitive or collaborative cohort structure for the startups in the cohort where most focused on a collaborative structure. This is echoed in the anecdotal feedback collected in the incubator manager interviews as well (i.e. with only 4 describing a competitive approach – see Figure 10). The literature on social exchange theory and on relationships between two trusted parties informs us that when a relationship between trusted parties exists within the incubator model, the relationship will further enhance the favorable outcomes because the exchange benefits both parties through a collaborative construct (Johanson and Mattson, 1987; Hu and Korneliussen, 1997; Dirks and Ferrin, 2002).

Many of the incubator managers agree that a more collaborative approach is necessary to make the incubator experience enjoyable so that startups will recommend it to other founders in the future.

McAdam and McAdam (2008) research explored the idea of creating a more competitive structure to get startups to participate in services and access resources may drive higher levels of participation. This dissertation extends the research by providing that a hybrid model within a cohort structure is a possible approach that should be further explored. This model would leverage the incubator manager to drive a cohort culture that is competitive in an effort to increase participation in network events and other programming and then toward the end of the incubator cohort timeline, drive a more collaborative model so that the startups are more collaborative and mutually supportive. This model would extend existing research that an incubator must choose one or the other—competitive or collaborative—cohort culture rather than a hybrid. Further exploration on this hybrid model might be the most effective.

This dissertation presents a more dynamic and flexible model that could work to benefit the startup and to drive deeper connections with the incubator manager and the other startup cohort members. The creation of this flexible model could drive greater startup participation in the incubator network events and, in turn, is expected to drive improved overall outcomes in performance. With the strong desire within the incubator community to identify best practices in running business incubators, this research establishes a formula for best practices that will drive more successful outcomes.

Opportunities for Future Research

I believe that both these findings and interview insights collected from this data, and these limitations can lead to exciting opportunities for future research in the area of incubator and accelerator structure and entrepreneurial ventures.

Hybrid Model Tests

As explored in this dissertation, there are many factors that impact the performance outcomes of a startup. Future research should continue to explore putting forward operating models that may improve performance of both the incubator and the startups. For example, the next step in evaluating the incubator model and hybrid cohort culture example from this research should be undertaken. Working jointly with an incubator to deploy and test the proposed model further would be important to providing additional recommendations on structure. Further testing on the hybrid model and the use of a competitive cohort culture first and then one that shifts to a more collaborative culture structure would be important to test. Practical assessments for how to implement and foster these different cultures should also be explored based on the Kunda (2009) framework for engineering and influencing culture, so that additional guidance can be given to incubator managers who would like to test and deploy these types of hybrid models. Having a direct comparison between a hybrid model versus one that is solely competitive or collaborative would be important to test in the future as well.

Incubator Manager Role

Continuing to evaluate the role of the incubator manager, their job description and the types of credentials that would be most advantageous for the incubator model structure is critical to

future incubator model research. Better understanding the functional role and the need for them to be full time and fully present to offer advice and guidance to the startups in addition to the administrative functions of the incubator will be critical. Future research that reviews all of the most successful and/or longest serving incubator managers to better understand their personal traits, skills and experience would be valuable to guiding incubators and accelerators on what to look for in this leadership role to help facilitate the greatest startup performance, as well as guiding future academics and practitioners who would like to serve as incubator managers to better understand the skills and abilities necessary to demonstrate to secure one of these coveted roles.

Future research should also explore a two-party leadership team where one is the incubator manager focused solely on guiding startups while another role would focus on the administrative functions and programming that are also important to startup success. The role of that incubator manager in facilitating a combination of competitive and collaborative cohort culture at different times should also be explored. Incubators are constantly seeking to get the attention of investors, so identifying a construct by which incubators could demonstrate their operating model and programming will have the best outcomes could be valuable to the attraction of investor dollars.

Screening Founder Traits

Further research should be undertaken around startup founder traits—in particular openness and conscientiousness screenings—in practice. It would be interesting to test the theory further that screening and selecting for those traits would have improved outcomes over founders without those traits prevalent. In addition, there are open questions about whether these same personality traits apply in industry-specific incubators. For example, how would an engineering

centric startup incubator cluster rate on a scale of openness when traditionally, engineering founders may have less openness and extraversion than the general startup founder?

Many of the incubator managers identified the idea of “coachability” traits in their selection criteria. Further research should be explored to identify any connection between the idea of coachability and how it might connect to the Big-Five. Creating a screening process tool to assess for openness and conscientiousness and testing it among incubators and accelerators would be valuable for incubator managers as well.

Programming

Further evaluation of programming, including the importance of it and the effectiveness as it relates to the application of those learnings into the startup should also be further explored. Incubator managers anecdotally shared during the interview process that a great deal of time in coordination and expense of the incubator is spent on coordinating and facilitating the programming. While some reported that many startup applicants view the quality of programming as critical when evaluating which incubators in which they would like to participate, incubator managers seem to be a bit more skeptical in the need to offer such extensive programming. Future research should evaluate the variety of programming and whether all of it is necessary to drive success, whether some could be augmented by customized or one-on-one training for startups who need it versus full cohort training, or whether full programming is necessary at all and all training should be customized and personalized for each start-up to best meet their needs where they are at in the startup process. An optimal model of programming that would include structures, course overviews and budget spend recommendations would be very valuable to the incubator and accelerator communities.

Recruiting Startups

With the increased number of incubator and accelerator offerings, the level of competition among these entities for the best potential startups continues to grow. Future research to better understand what attracts those high-potential startups would be valuable to incubator and accelerator managers who are structuring their offerings and figuring out how to best allocate their budgets to balance attractiveness to startups with drivers of performance outcomes.

In addition to identifying what startups are looking for and what attracts them to want to apply to incubators and accelerators, future research should also be considered in how to best market offerings to startups. For example, are startups more likely to learn about incubator and accelerator offerings through referral networks, through academic settings, through direct mail or digital or social media marketing. Having a deeper understanding for how startups learned of a particular incubator or accelerator, what drove them to apply, and how many they applied to and why would be helpful to inform future incubator and accelerator marketing approaches.

Emerging Incubator Types

There is a great deal of variation in types of incubators and further research may provide additional insights into how different organization types currently are modeled and how they should be structured in the future for improved outcomes. Further exploration into the myriad of existing startup supporting models should be taken. New concepts in the area of business incubation are emerging and would benefit from further exploration. These models and types might include:

- **Business Incubator and Business Accelerator Models:** An exploration of the similarities and differences in startup support models based on the startup versus

scale up timing of a business. Do they need different types of program, different screening, different cultural models, different measurement and metrics around performance, different programming in an accelerator because they are further along in their business maturity? What would the most beneficial structure for those be? What is the role of the incubator or accelerator manager as a result? How does the screening trait process differ between incubator and accelerator candidates?

- **Specialty Models:** Studying the incubator and accelerator models within unique or specialty types and making recommendations on recruiting, screening or structural changes on these types of organizations would be useful for future research. Potential considerations should be given for organizations like social venture incubators, university versus public or private incubators, startup super cluster organizations or industry specific incubators, virtual incubators, corporate incubators, and soft landings programs, which include incentive packages to recruit specific startup types to a city for development. All of these structures would benefit from further exploration and are eager to understand how best to structure their organizations, attract and retain the best and brightest startups and to explore budget and spend priorities.
- **University Incubators:** In discussions with incubator managers or directors at university incubators, two additional questions came up frequently in the interviews with incubator managers that should also be explore in future research. These included university incubators and whether they should be open to just students or expanded to alumnae, academics, staff and the greater community, as well as models for support.

- **Incubator and Accelerator Budgets:** Incubator managers are also interested in learning more about budget spend best practices and getting guidance on best practices around spend by incubator model structural element for improved outcomes. For example, how do they divide spend between recruitment, retention, programming, incubator manager, facilities, monitoring and measuring should be explored and shared.
- **Cohort Length:** There is a great deal of variability in the length of cohort times. While many in the research interviews described six months as typical, some were going even longer and up to a year or with no defined end date. As described in Rahman and Korn (2014), alliance performance is more important than alliance longevity, so further exploration of shorter, tighter timeframes of cohorts might yield improved outcomes because startup founders are even more motivated to take full advantage of all that the incubator has to offer before their time ends.
- **Idea-Less Incubators:** A couple of the incubators studied raised the idea that they might move to “idea-less incubation”— meaning they are welcoming individuals with the entrepreneurial traits but who have no business idea they are presenting and no specific business plan created that they are seeking to advance. These individuals then brainstorm areas that would benefit from a value proposition and build a business to fill that need. Evaluation around that selection criteria and structure could benefit from further research.
- **Cohort-Less Incubators or Custom Cohorts:** Another emerging debate that came to light during the interviews for this dissertation was the discussion over whether a cohort model is even the correct one and whether it limits the advancement of

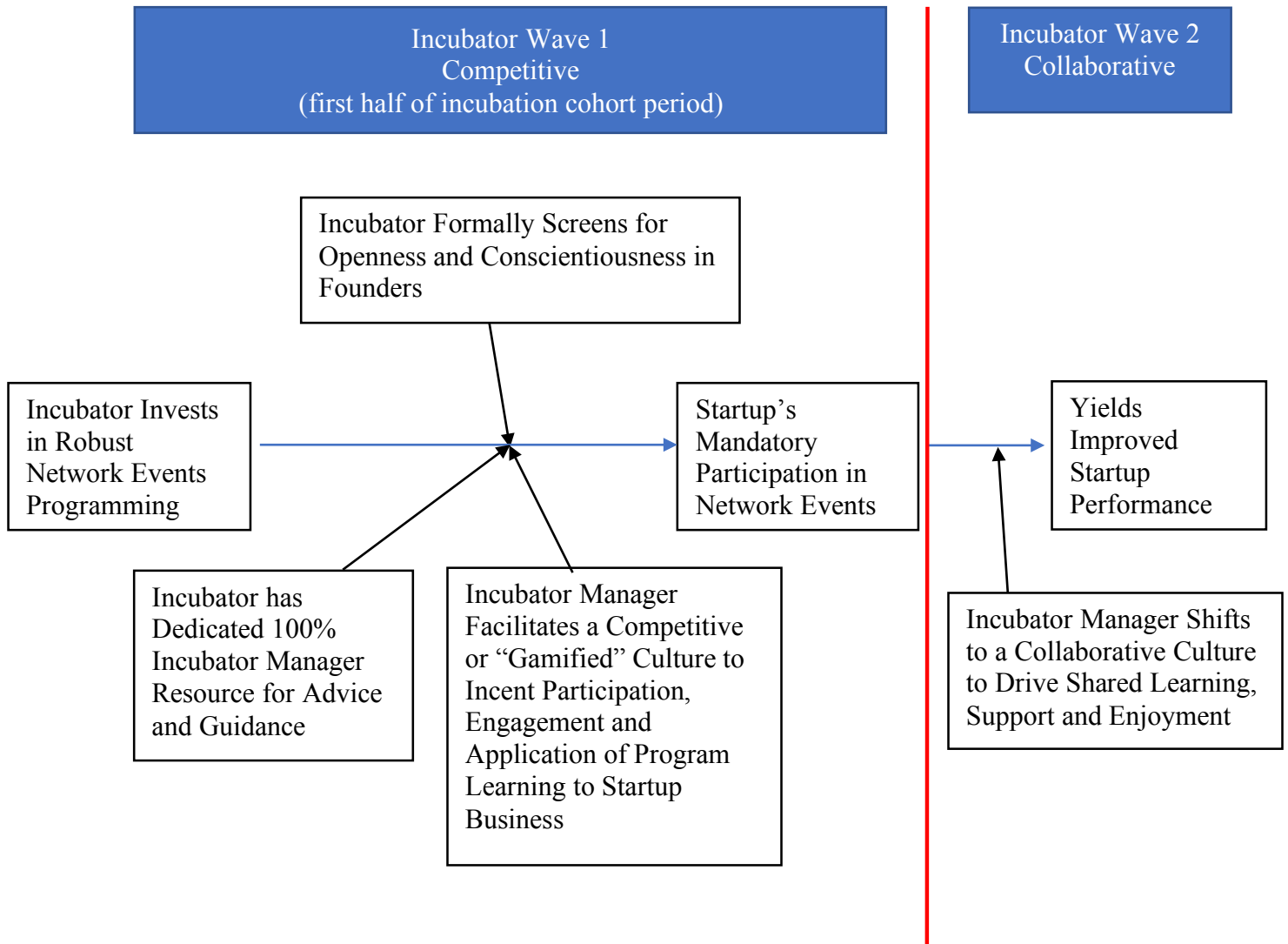
some businesses that may be at different stages. Instead, research should be conducted into an emerging incubator model called the “cohort-less incubation” model or a “custom-cohort” model, which would be designed for rolling admissions and a highly-customized program specific to that startup to meet the evolving needs that they have at any given time instead of giving all members the same coursework and programming.

- **Big City Bias:** Some interesting challenges arose in discussions with mid-western incubators as compared to larger city incubators. Where the larger urban centered incubators said their biggest challenge was attracting compelling startups, they expressed that they did not have as much of a concern over finding mentors, program leaders and investors. In the more rural incubators, they described having a large number of startups, but limitations around access to investors, mentors and programming. Many discussed the idea that they partner in a shared services model to benefit both rural and urban. This idea of shared services incubators and virtual incubators would benefit from further exploration.

Additional implementation of the proposed incubator model and testing would be valuable to understand the impacts of a model like the one constructed here would continue to advance the research in business incubation and would provide practical applications on structure and investment for improved outcome. The proposed model can be found in Figure 12 below.

Figure 12

Proposed Hybrid Model Incubator Structure for Further Testing



Conclusion

This study set out to explore a proposed incubator model that could facilitate greater startup performance, including facilitated network events, as well as the moderating effects of the startup founder’s personality traits, presence of an incubator manager, and the incubator’s competitive versus collaborative culture. The objective of this dissertation is to develop a model for incubators that takes into consideration the moderating factors that drive greater participation in network events and greater use of the learnings from these events, and that results in improved startup

performance. This dissertation also seeks to connect factors like a startup founder's personality traits of openness and conscientiousness and incubator features like the presence of an incubator manager with a competitive versus collaborative culture. It looks at the ability of these factors to generate greater participation in network events, thereby positively impacting startup performance.

While the hypotheses tested, with the exception of Hypothesis 1, were not supported, further exploration of the model is encouraged. Many of the incubators were anxious to discuss different approaches to models and budget spend to improve outcomes and evaluate new techniques. There is a desire among those interviewed to explore better way to run the incubator, attract new startups and create a more focused approach to spending.

Thus, I believe this study should serve as the starting point for future research on:

- The presence and role of incubator managers in providing regular advice and counsel to the startups, but also in testing different approaches to incubator structure—namely collaborative and competitive approaches.
- Dynamic or hybrid cohort culture structure whereby the incubator manager is creating a competitive structure to drive event participation, but then adjusts to facilitate a more collaborative structure for shared insights and application to the entire cohorts' businesses in a collaborative manner.
- Selection criteria for startup founders and in particular, the screening of the level of openness and conscientiousness and their related traits as part of the evaluation process
- Programming and in particular the timing and effort spent on building a variety of training versus just focusing on facilitating strong network events and using cohort culture to drive participation

Ultimately, the value of this study lies in how the findings can be used by practitioners and incubator managers to strengthen their incubators to attract more startups, to get a better idea of where to invest dollars, and ultimately to improve startup performance outcomes. For startups, the value lies in understanding what structures might best support their efforts in getting the most value from an incubator to drive improved outcomes for their business idea.

This dissertation approached incubator and accelerator structure from a unique perspective, creating a potential new model for improved outcomes. Incubator managers must continue to evolve in how they structure to change with the times and emerging trends in startup incubation. Through future research and practical application, it is my hope that the number of incubators and startups they support will continue to grow as it is ultimately good for economic development of our communities, innovation, and employment.

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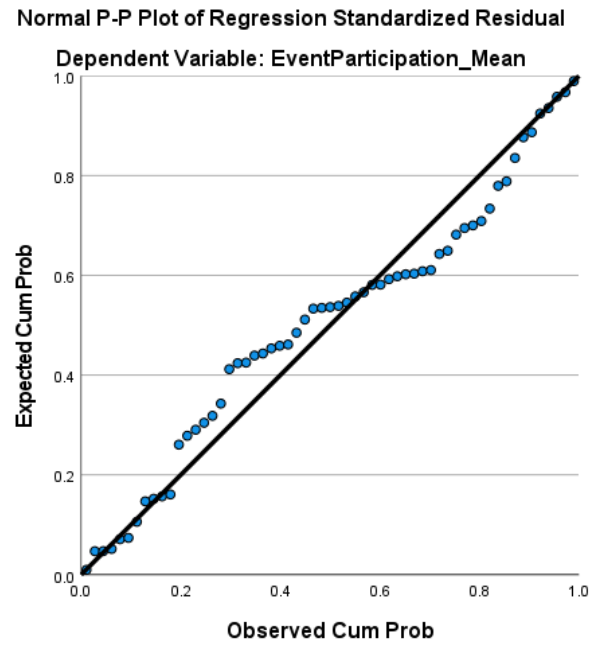
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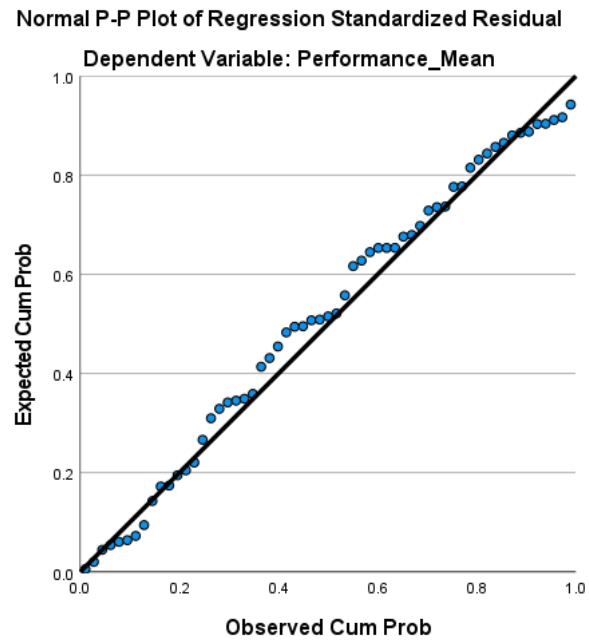
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Appendix

Appendix A

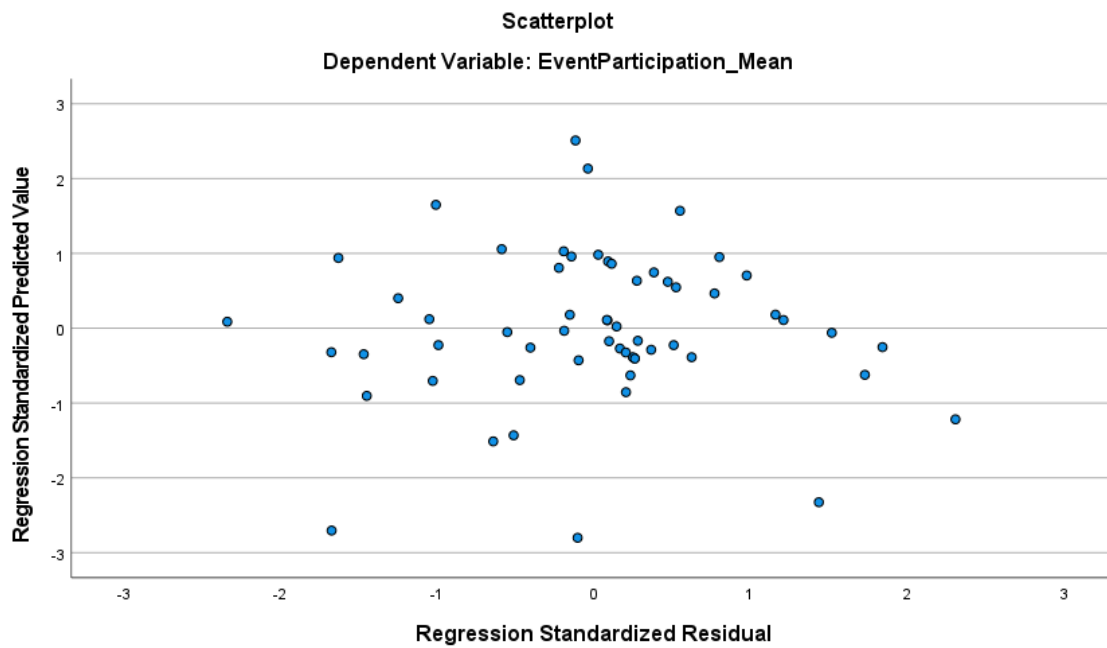
Normal P-P Plots

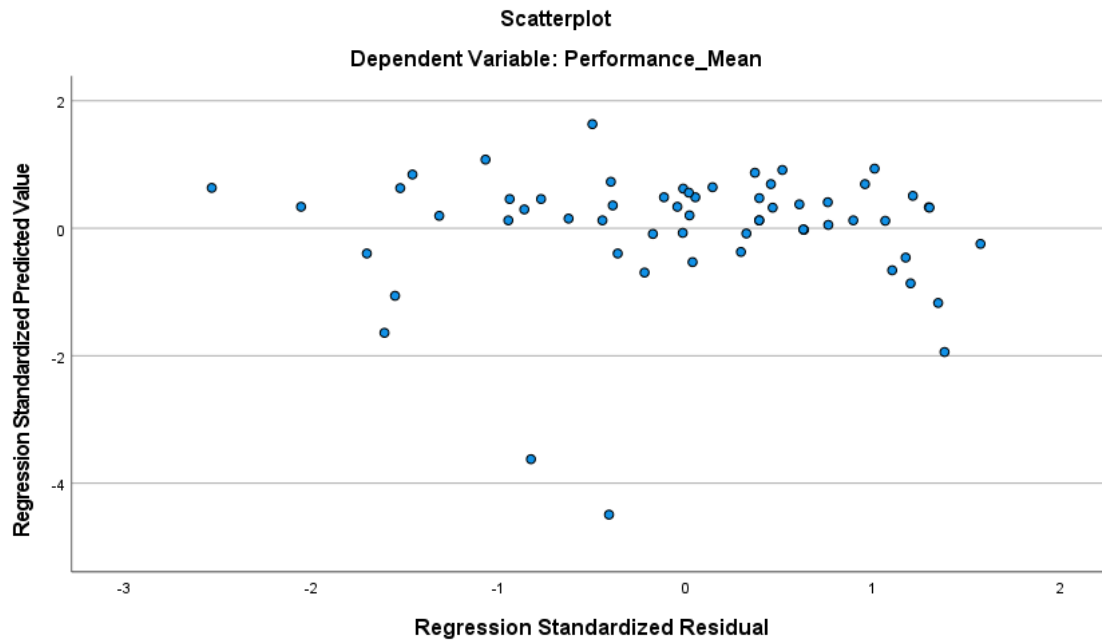




Appendix B

Scatterplots of Residuals Versus Predicted Values





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