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The Value of Business Incubators and Accelerators from The Entrepreneurs Perspective

by

Ginger Suzanne Lange

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Executive Doctorate in Business

In the Robinson College of Business

Of

Georgia State University

GEORGIA STATE UNIVERSITY

ROBINSON COLLEGE OF BUSINESS

2018

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ACCEPTANCE

This dissertation was prepared under the direction of the *GINGER SUZANNE LANGE* Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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LIST OF TERMS

In common, industry and academic language, there is variation in the interpretations of certain words, I provide a brief explanation of how I use a few key terms in this research. Other definitions, especially if they depart from the definitions below, will be provided within the body of this paper.

Business: an organization formed to offer good(s) or service(s) typically with an attempt to garner a profit; used somewhat interchangeably with company, firm and establishment.

Entrepreneur(s): Used somewhat interchangeably with founder(s) as a person (or set of persons) that has established or is in the process of establishing a business; typically, with an implied aspect of newness under the conditions of considerable initiative and risk.

Startup: New business; the act of bringing forth and initially growing a new business

ABSTRACT

The Value of Business Incubators and Accelerators from The Entrepreneurs Perspective

by

Ginger Suzanne Lange

May 2018

Chair: Wesley James Johnston

Major Academic Unit: Executive Doctorate in Business

For several decades, the business creation rate has declined in the United States. Scholars and practitioners debate the reasons for the descent, but most agree that it is undesirable. Entrepreneurial sponsors (e.g., government, investors) seek ways to foster strong business startup ecosystems to attract and sustain new companies. Entrepreneurs gravitate toward these concentrated ecosystems to efficiently access resources to improve their odds of startup and survival. Business incubators and accelerators (BIAs) have become prominent in entrepreneurial ecosystems. By consolidating startup-related services, the BIAs offer programs that help entrepreneurs access scarce resources and build capabilities to enable new business growth.

Although BIAs are increasingly popular, there is debate as to their efficacy. The focus of this empirical research is to explore whether entrepreneurs, as the first-hand BIA users, value the BIA programs as a useful tool for progressing their businesses. And if they do find value, then understand what is driving this worth. The study leverages resource-based theory as well as task effort cost theory using quantitative and qualitative methods for analysis.

The research findings indicate that entrepreneurs find BIA programs very valuable for improving their business outcomes. The entrepreneurs express that the program experience is

worthwhile regardless of whether their businesses ultimately survive. Moreover, the entrepreneurs strongly recommend the usage of BIAs to fellow entrepreneurs. Many factors contributed to this value, but knowledge resources (e.g., mentors, network) tops the list. Incubator users indicate a reduction in expenses to be most impactful on value, while accelerator users find access to capital funding to be most impactful.

The research contributes to the academic body of knowledge concerning entrepreneurial processes and the application of resource-based theory. It contributes to the literary conversation by providing a supportive position regarding BIA efficacy and bringing forth a variance model to understand contributing factors as well as highlighting differences between incubators and accelerators. Moreover, the study educates entrepreneurs about the potential experience and outcomes from BIA usage. It informs BIA administrators and sponsors about potential ways to provide greater value to their users. Overall, the study's contributions aim to foster business dynamism.

INDEX WORDS: United States, Incubator, Accelerator, Quantitative, Business, Resource-Based Theory, Entrepreneur, Startup, Dynamism, Empirical

I INTRODUCTION

Business creation is essential to free-market economies all over the world. Society counts on new firms to bring forth innovative products and services for economic trade and create employment that enables prosperity. In a progressing market, economists expect an increasing or a steady positive rate of business creation accompanied by a healthy counter-balance rate of business closures as new ideas and efficiencies render previous concepts obsolete. Unfortunately, for several decades, the business creation rate has been on the decline in the United States. The reasons for the decline is not yet understood, but the trend is disturbing. (Fikri, Lettieri, & Reyes, 2017)

Research trend data indicates that one of the consequences of declining business creation in the United States is a migration of entrepreneurial activities toward populous metropolitan areas (Fikri et al., 2017). Many of these metros are actively fostering entrepreneurial support organizations and resources to attract and grow startup firms to stimulate local economic growth. Aligned with resource-based theory, entrepreneurs gravitate toward these entrepreneurial ecosystems to access these concentrated resources with an expectation that they will improve the odds of startup and survival in competitive environments.

In recent years, business incubators and accelerators (BIAs) have become prominent support organizations in entrepreneurial ecosystems. Recognizing that fledgling firms are vulnerable due to insufficient resources and capabilities, BIAs consolidate access to numerous services that may help with business startup and growth. For example, the types of resources offered by BIAs may be knowledge resources (e.g., classes, mentors), funding resources (e.g., access to investors for early-stage capital), and infrastructure resources (e.g., office space).

Although BIAs are increasingly popular, there is mainstream and academic debate as to their efficacy and how they deliver value. Broadly, the academic community has mixed reviews. Prospective entrepreneurs wonder whether BIAs are worthwhile investments of time and effort. BIA sponsors wonder whether BIAs are worthwhile time and financial investments.

The purpose of my research is to contribute to this mainstream as well as academic conversation about the efficacy of business incubators and accelerators as well as provide additional insights to the aspects of these programs that may drive value. I target learning from entrepreneurs that are current or past participants of BIA programs, the first-hand users, to understand from their vantage point whether the programs are worthwhile investments toward improving business outcomes and enhancing their entrepreneurial experience. Going directly to the entrepreneurs to understand their experiences adds a dimension of learning about BIA value beyond raw output measures (i.e., jobs created, capital raised) of an incubator's or accelerator's portfolio; these metrics are important, but one may lose the bigger picture. Given this scope, the research questions are as follows:

To what extent do entrepreneurs value business incubators and accelerators?

And what contributes to this value?

To answer these questions, I conduct an extensive online survey of entrepreneurs in the United States that are currently participating or have previously participated in incubator or accelerator programs. The respondent answers are primarily analyzed through quantitative methods, but then supplemented with qualitative analysis. The results indicate that the entrepreneurs find these programs very valuable for improving their business outcomes. The value is so compelling that these entrepreneurs felt the program experience to be worthwhile

regardless of whether their businesses ultimately survived. Moreover, these entrepreneurs strongly recommended the usage of BIAs to fellow entrepreneurs. Many factors contributed to this value, but knowledge resources (i.e., mentors, access to experts, coaches) and culture (i.e., entrepreneurial environment, like-minded network) topped the list.

This engaged scholarship research contributes to academia and practice. From the academic perspective, the study adds to the body of knowledge of entrepreneurial processes and the application of resource-based theory as well as provides literary support toward the value of business incubators and accelerators. For practitioners, the study provides practical information to entrepreneurs, especially those prospecting BIAs. Also, BIA program administrators and their sponsors (i.e., investors, governments) should be encouraged by this study's findings in that it reinforces that entrepreneurs value their efforts to create supportive entrepreneurial environments. The study provides insight into what the entrepreneurs find beneficial about the programs and where opportunities for improvement may lie. In understanding these factors and building upon their underlying themes, administrators can continue to progress their programs and recruitment, ultimately inspiring more entrepreneurs and increasing positive business dynamism.

I.1 Background: Importance of Fostering Entrepreneurship

I.1.1 *Business Dynamism and Its Importance*

What makes entrepreneurship grow? Moreover, why does entrepreneurship thrive in some places, but not in others? These questions are arguably the most significant challenge in economics today (Reedy, Fairlie, Morelix, & Russell, 2016). Based on these critical issues, the term 'business dynamism' has become popular in recent literature (Fikri et al., 2017).

Business dynamism refers to the rate of company churn in an economy; it is common to measure this churn as the number of establishments that start and close in an economy over a period, typically one year (Fikri et al., 2017). It is a positive metric usually signifying that the number of establishments starting outpaces closures. Business dynamism is essential to national, regional, and local economies because they all depend upon constant economic rebirth (Fikri et al., 2017). This rebirth happens when businesses bring to market new ideas, technologies, and business models, within- or cross-industries, that are continually disrupting and replacing those of the past (Fikri et al., 2017). The introduction of new companies challenges the status quo by increasing competition as well as influencing employment through job creation or switching (Fikri et al., 2017). When an economy has high rates of dynamism, this continuous rebirth cycle ensures the economy is progressing instead of stagnating or regressing; and this expansion is a sign of improving productivity, job growth and rising standards of living (Fikri et al., 2017).

I.1.2 *Decline of Business Dynamism in The United States*

“America has long been known around the world as a nation of dreamers, of risk takers, of hard workers—nation of entrepreneurs” (Fairlie, Morelix, Reedy, & Russell, 2016). The United States has a legacy of innovation and economic strength that supports its reputation as a country of business opportunity leading to enduring prosperity for many of its citizens (Fikri et al., 2017). A healthy level of business dynamism, driven by vigorous startup activity, is vital to the United States maintaining its leadership and economic affluence (Fairlie, Morelix, Reedy, et al., 2016).

Unfortunately, the United States is experiencing a steady decline in business dynamism (Fikri et al., 2017). A decrease in business dynamism refers to a decreasing trend churn (the entering and exiting of establishments in the economy). In the case of the United States, there is

a constant decay in establishment starts. Figure 1 shows this apparent decline in the rate of establishment entries based on data from U.S. Census Bureau (2014, 2015). In this reference, an establishment is a fixed physical location where economic activity occurs and employs at least one employee beyond the owner (i.e. not including self-employed). From 1977 to 2015, the startup rate for establishments dropped meaningfully from 17% to 10%. This deterioration in dynamism reached an all-time low during the Great Recession years of 2009 and 2010. During this period, the rate of establishment entries dropped to 9%. “From 1977 to 2014, the number of new firms per \$1 billion in GDP fell from 95 to 25” (Fikri et al., 2017).

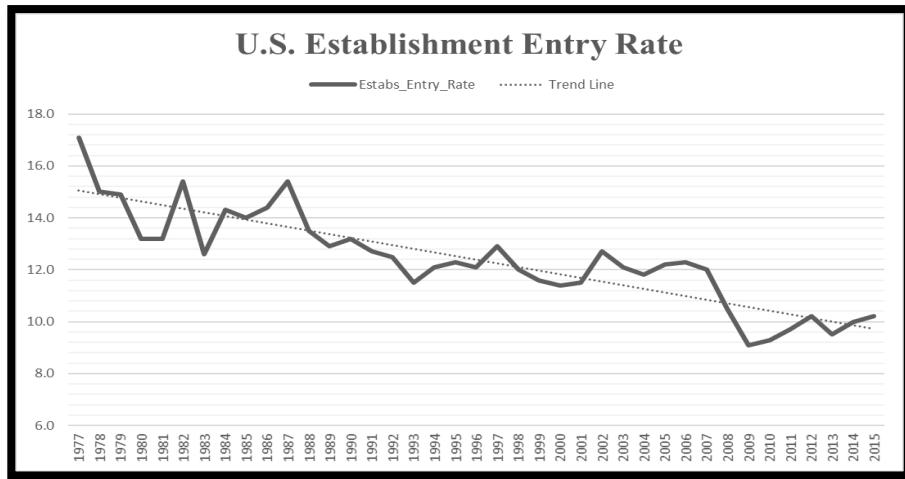


Figure 1 Decline of U.S. Establishment Entry Rate (Census, 2014, 2015)

Another way to view the situation is to examine it through the business dynamism metric, which again is the churn of the number of establishments that start and close in an economy over a period (Fikri et al., 2017). Figure 2 shows this metric. From an examination of the chart, it is evident that business dynamism has improved since the 2009 recession, but still lags earlier years.

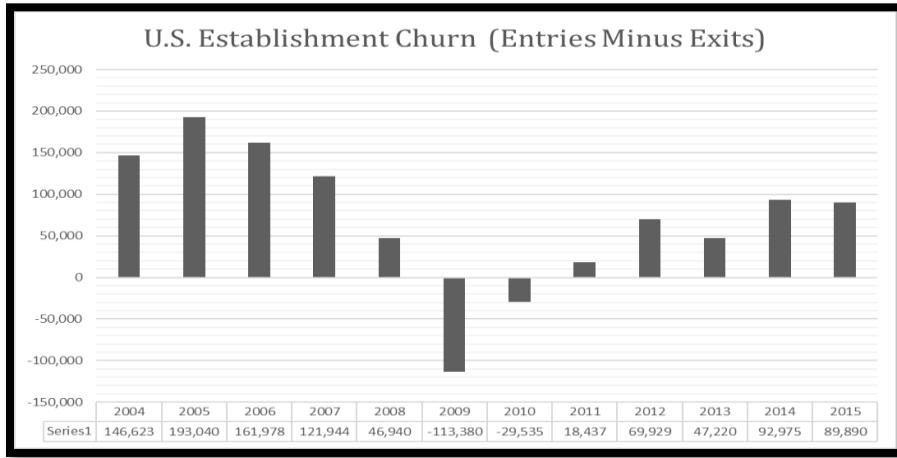


Figure 2 U.S. Establishment Churn (Census, 2014, 2015)

I note that it is unclear whether the U.S. Census Data, in its definition of an establishment as a physical location where economic activity occurs, may not be accounting for online businesses. There may be some connection to online commerce and fewer jobs in that the U.S. Bureau of Labor Statistics reports that “the number of jobs created by establishments less than 1-year old has decreased from 4.1 million in 1994, when this series began, to 3 million in 2015. This trend combined with that of fewer new establishments overall indicates that the number of new jobs in each new establishment is declining. (United_States_Department_of_Labor, 2016)”

I.1.3 Decline of The United States In Global Startup Rankings

As noted earlier, the United States is known globally for business creation, but in recent years it has slipped on the world stage. The Robinson Country Intelligence Index – RCII (GSU, 2017) shows that the U.S. has deteriorated in a critical entrepreneurial indicator, ‘Starting a Business’; this indicator is a measure of ease of starting a business in each country. The RCII is an interactive tool that tracks Governance, Economics, Operations, and Society through 88 sub-dimensions for up to 199 countries (2017). Per the RCII, the United States has dropped its

world rank in ‘Starting a Business’ by 17 positions from 5th in 2005 down to 22nd in 2015 as shown in Table 1 (2017).

Table 1 RCII Starting A Business Indicator - U.S. Declining

Business Indicator: Starting A Business					
2005		2015			
Country	Rank	Score	Country	Rank	Score
Canada	1	1000	New Zealand	1	1000
Australia	2	933	Macedonia	2	991
New Zealand	3	930	Canada	3	909
France	4	825	Lithuania	4	864
United States	5	820	Armenia	5	859
Singapore	6	817	Azerbaijan	6	854
United Kingdom	7	775	Singapore	7	842
Denmark	8	754	Georgia	8	839
Ireland	9	739	Australia	9	838
Finland	10	714	Portugal	10	804
Iceland	11	710	United Kingdom	11	803
Jamaica	12	709	Jamaica	12	800
Sweden	13	708	Kazakhstan	13	797
Israel	14	705	Ireland	14	782
Romania	15	704	France	15	758
Norway	16	664	Ukraine	15	758
Panama	17	642	Latvia	17	747
Iran	18	624	Malaysia	18	733
Mauritius	19	593	Moldova	19	724
Latvia	20	592	Netherlands	20	721
Thailand	21	580	Mongolia	21	718
Turkey	22	572	United States	22	711

Also, from this Table 1, over this ten-year period the United States’ absolute score has dropped 109 points indicating that the decline in rank is not only due to improvements in other countries, but negative changes in the United States. One indicator, a sub-dimension in the RCII index related to ‘Starting a Business’ that provides a hint to a growing problem, is ‘Time to Start a Business (days)’. In the ten-year period of 2005 to 2015, this sub-dimension index score dropped from 859 down to 679, thus dropping the United States world rank from 4th down to the 31st position (GSU, 2017).

I.1.4 *Impact on Industry Sectors, Firm Age And Labor*

The slowdown in new business creation is pervasive across industries; new firms are disappearing across all sectors and all geographies (Hathaway & Litan, 2014). The reason for the decline is still not understood. For example, the evolution from a manufacturing-based to a service-dominated economy should have increased the startup rate, given that barriers to entry are lower and firm sizes are on average smaller in the less capital-intensive services sector (Fikri et al., 2017). Even high-growth, technology-based firms experienced a rapid fall starting in 2000 (Decker, Haltiwanger, Jarmin, & Miranda, 2014) and since then, the decline has been even more pronounced than the decrease in entrepreneurship economy-wide (Hathaway, 2014).

“One apparent outcome of declining dynamism is that the economy is increasingly being driven by a concentrated number of larger, older firms, often clustering in specific geographies; the average firm is now older than ever recorded in recent history” (Fikri et al., 2017). In 1977 over 16 percent of all businesses in the United States was less than one year old, but by 2014, that figure halved to 8 percent (Fikri et al., 2017). The concern of having less new firms challenging incumbent firms is that it decreases competition, decreases productivity and ultimately makes the economy less resilient (Fikri et al., 2017). The deficit in new businesses significantly harms the labor market, muting both the quality and quantity of job growth; for example, the economy would have likely produced 924,000 additional jobs in 2014 had the startup rate been as high as in 2006 (Fikri et al., 2017). Larger, older firms now employ a record portion of the workforce; in 2014, three of every four American workers were on the payrolls of companies at least 16 years old (Fikri et al., 2017). “Unfortunately, longer-term incumbent companies typical produce new jobs at a slower rate in fewer geographic areas than a constant inflow of start-ups” (Fikri et al., 2017).

I.1.5 *Reasons for The Decline In Business Dynamism*

The reasons for the long-term structural and short-term cyclical declines in business creation is yet to be understood (Fikri et al., 2017). Some potential causes for the fall, especially in recent years, are as follows: changing demographics, lack of start-up capital, consolidation within banking sector, volume of regulation and tax complexity, companies opting for acquisition instead of IPOs, need to redefine antitrust, shifts in innovation landscape and lack of public investment in basic R&D, rising use of non-compete agreements, occupational licensing complexity, and many other causes (Fikri et al., 2017). Given the many headwinds that create barriers in the path toward business creation and growth, it is evident why entrepreneurs yearn for assistance.

I.1.6 *Incubators and Accelerators Support Entrepreneurship*

As outlined, entrepreneurs face many challenges as they startup; lending their firms to a high-risk of failure or limited growth (Hallen, Bingham, & Cohen, 2014). They are often vulnerable due to insufficient experience, resources, capabilities, and credibility (Shepard, 2017). Business incubators and accelerators formed to help fledgling firms overcome these vulnerabilities during the startup and early-growth process. Jeffery Shepard (2017) liken these institutions to an incubator in a hospital for a premature infant in that they seek to “nurture, guide and sustain the life of a business as it attempts to get its feet on the ground.” The interest in supporting entrepreneurs is extensive as represented by their wide-range of BIA sponsors from federal, state and local governments inclusive of small business administrations, as well as universities, private investor groups, and corporations (Yu, 2016). There are differences and similarities in the characteristics of BIA programs as I will detail.

I.1.6.1 Business Incubators

The concept of an incubator is credited to have its start “in 1956, when a hardware store manager named Joseph Mancuso converted an abandoned 850,000-square-foot manufacturing complex in Batavia, N.Y., into a new kind of facility he called the Batavia Industrial Center” (Dahl, 2011). Mr. Mancuso provided entrepreneurs with a collaborate office space with access to experts to provide business advice (Dahl, 2011). Mr. Mancuso began calling the facility an incubator, after seeing newly hatched chicks running around the building from a chicken processor startup (Dahl, 2011).

Today, business incubators continue the tradition by providing entrepreneurs with subsidized office space and shared services, such as office equipment, internet access and experts in a dedicated facility. Because the entrepreneurs and the incubator staff are in the same area, these startup incubators have the opportunity to offer multiple modes of assistance (Rice, 2002). In addition to incubator staff and experts, entrepreneurs benefit from interaction with other startups (Dahl, 2011). Entrepreneurs typically stay in an incubation center for three to five years before they graduate, although there is usually no maximum period (Linton, 2017). Most incubators operate as nonprofits and have become a staple for many local governments and universities seeking to attract and retain entrepreneurs (Dahl, 2011). In recent years, given the focus on technology and globalization, some incubators include or have evolved to ‘virtual business incubation’ where they use web-based technologies to expand their services (Shepard, 2017). Also, specialized incubators (and accelerators) have emerged to address specific verticals and industries, such biotechnology and financial services (Knopp, 2007; Shepard, 2017) as well as underrepresented groups such by gender and race (Yu, 2016).

I.I.6.2 Business Accelerators

Business accelerators are a more recent addition to the entrepreneurial ecosystem with one of the first accelerators, Y Combinator, founded in 2005 (Hallen et al., 2014). Accelerator institutions are organizations that “aim to accelerate early venture gestation by providing cohorts of ventures with formal education and mentorship connections during intensive, temporally-compressed programs -- usually lasting three months. During the three months, it is not uncommon for new businesses to meet with over fifty mentors, experience a ‘mini-MBA,’ and develop new products or services” (Hallen et al., 2014). Most of the accelerator managers are experienced business owners and investors (Dahl, 2011). In exchange for the accelerator’s services and funding, new firms typically have to provide a 6 percent equity stake (Dahl, 2011). Most programs conclude with a demo day where founders pitch their business concept to a large audience of investors (Cohen, 2013). Accelerators are best for fast growth companies that want to attract investors quickly (Dahl, 2011). Another characteristic of accelerators is their high selectivity for entry into their programs. For example, “on average, members of the Global Accelerator Network (GAN) receive 450 applications [annually] and only accept 2.1 percent of them” (Ortmans, 2016). Some debate that accelerators may be more effective because companies raise capital financing faster and if warranted failure faster “allowing founders and investors to reallocate resources more efficiently” (Yu, 2016). But opponents may question whether a high level of entry selectivity is a bias (Stokan, Thompson, & Mahu, 2015) as well as whether time-compressed learning is effective (Hallen et al., 2014).

I.I.6.3 Hybrids

Currently, in the United States, the exact number of distinct incubators, accelerators and similar organizations (i.e., technology centers, shared tinker-spaces, co-working start-up

communities, early-stage venture capitalist groups, seed funds groups) seems to be unknown especially due to evolving, morphing and blending of business models. There seems to be emerging confusion regarding the differences in these institutions (Ortmans, 2016). Combining studies that list incubator and accelerator numbers, there may be at least 1,400 BIAs in the United States of which at least 1200 may be incubators (Dahl, 2011; Hathaway, 2016; Rice, 2002), but this may be misleading given the blending of BIA concepts. In a recent research study (Hathaway, 2016), the author reviewed nearly 700 U.S.-based organizations “that were categorized as an accelerator or accelerator/incubator, either through self-identification or through the identification in various databases (Pitchbook, Seed-DB, Global Accelerator Network, and Accelerate), and fewer than one third could be confirmed to fit the more restrictive definition” of an accelerator. Ian Hathaway (2016) highlights a term called hybrid to explain some of this apparent blending; Table 2 shows a summary he provided in a recent article based on an adaption from Cohen (2013) and other authors. Even with this table as a concise summary, there are more variants. Some BIAs are even offering both incubator and accelerator services within the same institution. In this research, I will use self-declarations from the BIAs as well as reference databases (Crunchbase-Inc, 2018) to designate whether a BIA is an incubator or accelerator with an understanding that there are some inconsistencies.

Table 2 Variant BIAs and Their Key Differences (Hathaway, 2016)

	Incubators	Angel investors	Accelerators	Hybrid
Duration	1 to 5 years	Ongong	3 to 6 months	3 months to 2 years
Cohorts	No	No	Yes	No
Business model	Rent; non-profit	Investment	Investment; can also be non-profit	Investment; can also be non-profit
Selection	Non-competitive	Competitive, onging	Competitive, cyclical	Competitive, ongoing
Venture stage	Early or late	Early	Early	Early
Education	Ad hoc, human resources, legal	None	Seminars	Various incubator and accelerator practices
Mentorship	Minimal, tactical	As needed by investor	Intense, by self and others	Staff expert support, some mentoring
Venture location	On-site	Off-site	On-site	On-site

II LITERARY FRAMING

II.1 Theoretical Framework

In this chapter, I highlight relevant theories to this research, then complete a scan of extant BIA literature followed by a summary of the key literary questions. I begin by outlining a couple of theories pertinent to the business context foundation, namely creative destruction theory and entrepreneurial ecosystem theory. Then I progress to detail the research theories, namely resource-based theory and task cost theory.

II.1.1 *Foundational Theories*

II.1.1.1 *Creative Destruction Theory*

As described in the introduction of the paper, research on how to positively influence entrepreneurial business startups is vital to our society as their abundance is essential to economic prosperity. At the root of this thinking is a theory by Joseph A. Schumpeter. Schumpeter, who taught at Harvard University in the 1930s and 1940s, is arguably one of the most influential economists of the twentieth century; his study of capitalism led to his observation about the tenuousness of success is a tough fact every establishment business faces (Koch, 2015).

At the core of the business dynamism concept is Schumpeter's theory of creative destruction, where he explains that new and superior ideas, processes, and goods replace obsolete ones in a dynamic process of "creative destruction (Schumpeter, 1943). Business dynamism refers to the creative destruction rate and scale that manifests in firm churn in an economy (Fikri et al., 2017). In the creative destruction theory, the process concept is that well-performing, dynamic markets will continually reallocate resources according to their most productive use (Fikri et al., 2017). Over the long term, creative destruction benefits almost everyone who lives

in society; “when a business succeeds through creative destruction, a chain reaction ripples through a whole variety of firms and communities, hurting some and helping others – but on the whole, making people in society better off.” (Koch, 2015) “Value creation is the upside of creative destruction” (Koch, 2015). In dynamic local economies both sides of creative destruction, start and exit firm churn, are robustly present (Fikri et al., 2017). Per this research, I seek to add to the body of knowledge as to how business incubators and accelerators are a key element of business dynamism in entrepreneurial ecosystems.

II.1.1.2 Entrepreneurial Ecosystem Theory

“Day in and day out, much of what really matters for entrepreneurs is what is happening where they live and work—the connections they make, the leaders and mentors in the community, the skilled talent they access, the local infrastructure they use, and the quality of life in their community” (Reedy et al., 2016). Dubini (1989) originally defined entrepreneurial ecosystems or environments as characterized by the presence of family businesses and role models, a diverse economy, a strong business infrastructure, available investment capital, a supportive entrepreneurial culture, and public policies that incentivize venture creation (Spigel, 2015). “Others like Spilling (1996), Neck, Meyer Cohen, and Corbett (2004), and Kenney and Patton (2005) highlight features such as skilled workers, lawyers, and accountants specializing in the needs of new ventures, and large local firms or universities to act as talent attractors and spinoff generators” (Spigel, 2015). “More recent work by Isenberg (2010) and groups such as the World Economic Forum (2013) have argued that open local and international markets, available human capital and financing, mentorship and support systems, robust regulatory frameworks, and major universities be the most important pillars of an ecosystem” (Spigel, 2015). Spigel (2015) defines that “entrepreneurial ecosystems are combinations of social,

political, economic, and cultural elements within a region that support the development and growth of innovative startups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures.”

As noted, there are variants on defining entrepreneurial ecosystems, but at the core, it is about the strength of the support provided to entrepreneurs in their endeavor to start and sustain new businesses. BIAs position themselves as an essential element in the ecosystem to bring benefits to not only the entrepreneurs but to other key stakeholders such as the local government, investors, and society as a whole.

II.1.2 *Research Theories*

During this research, I tap into the underlying need for entrepreneurs to garner resources for existence and survival as their fledging stage does not allow them to have all the needed capabilities within the firm. Startups, like most firms, seek the most efficient path toward garnering the resources they need in such a manner to minimize cost expended and risk. In this case, the cost is not just dollars but time, effort, opportunity cost and the like. BIAs seek to support and streamline start-up processes, such as providing access to such resources as knowledge (i.e., mentors), infrastructure (i.e., office space), and assessing funding (i.e., investors). By efficiently consolidating access to these resources, it should drive benefits for the entrepreneurs. But to use the resources of the BIA programs, the entrepreneurs must still expend their effort. Ultimately, the entrepreneurs need to weigh the benefits versus effort to determine value. The premises behind this line of reasoning is rooted in resource-based theory as well as task effort cost theory. I briefly highlight these theories.

II.1.2.1 Resource-Based Theory

The premise for the resource-based theory is that performance of an entity differs based on its resources and how firms maintain unique and sustainable positions in the competitive environments (Miles, 2012). The theory focuses on efficiency-based differences and how they compete with other businesses based on their access to resources and capabilities (Miles, 2012). Entrepreneurs may seek BIAs to efficiently garner needed resources and capabilities to compete in the market. Based on a review of BIA websites and literary readings, the resources I explore in this research are Knowledge, Funding, Infrastructure, Technology, Market and Culture as characterized as follows:

- Knowledge: access to classes, seminars, mentors, coaches, experts and the like
- Funding: access to sources of seed funding through investors and financial institutions
- Infrastructure: access to office/meeting space, IT, administrative services and the like
- Technology: access to innovation, labs, intellectual property, researchers and the like
- Market: access to customers, corporations, suppliers, logistics, employees and the like
- Culture: access to an entrepreneurial environment, like-minded network, emotional support and the like.

II.1.2.2 Task Effort Cost Theory

The (human) expectancy-value theory, John W. Atkinson (1957), has been used in psychology to study achievement-related motivation and choice (Craven, Marsh, & McInerney, 2013). In the 1980s, Jacquelynne S. Eccles (1983) and many co-authors (Adler, T.F., Futterman R., Goff S.B., Kaczala, C.M., et al.,) evolved the concept into modern expectancy-value theory (Craven et al., 2013). The concept frames expectancy-of-success as well as the four value

constructs of attainment, intrinsic value (or interest), utility and cost (Craven et al., 2013). The final construct, cost, was recently refined by Flake, Barron, Hulleman, McCoach, and Welsh (2015) and is of interest in this research. Figure 3 shows the operational definitions of the cost dimension as task effort cost, outside effort cost, loss of valued alternative cost, and emotional cost (Flake et al., 2015). This cost element applies to this research as it gets at the trade-offs entrepreneurs must weigh when they decide whether it is worth engaging with BIAs (i.e., engagement tasks). In this study, I explore the four cost items noted in this theory along with other program use variables such as level of program structure, ease of entry into the program and ease of using program resources.

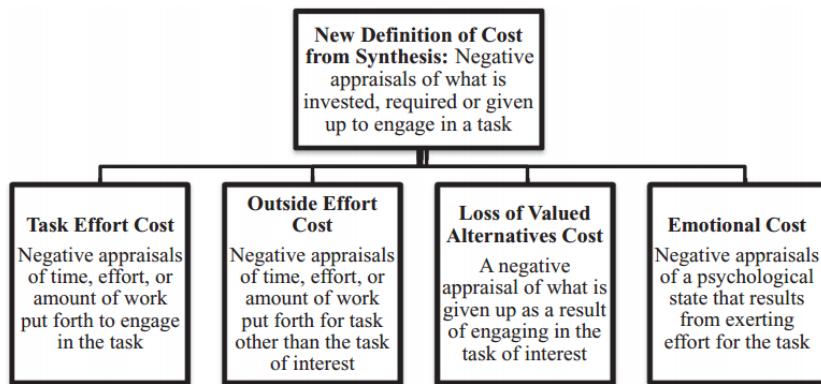


Figure 3 Task Cost Theory: Adapted Operational Definitions (Flake et al., 2015)

II.2 State of Academic Literature – Incubators & Accelerators

Some authors say that research may not be keeping pace with the evolving BIA phenomenon (Hathaway, 2016; Ortmans, 2016). To understand the state of the academic conversation regarding incubators and accelerators in the United States, I conduct a systematic literature review. Figure 4 shows a summary of the search strategy and publication results. As shown, I conduct five steps: 1) Establishing search string, 2) Running search string in each of the

four-selected business-related databases, 3) electronically screening within each of the databases based on research relevant filters as available (i.e., language, location, date, peer-reviewed / scholarly), 4) removing duplicate references across the databases, and lastly 5) manually reading the remaining reference documents (i.e. abstracts, citing, text) for relevance and missed electronic filtering. The result is 89 publications.

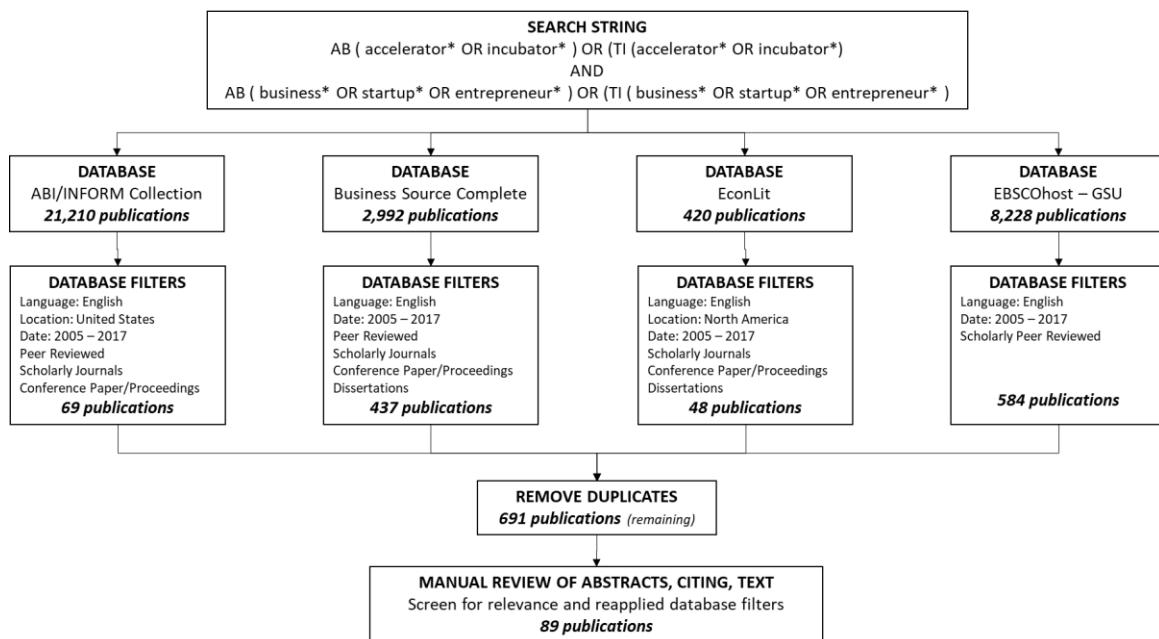


Figure 4 BIA Literature Review Search Strategy

For clarity, I explain the rationale for items in the search strategy. The business studies librarian at Georgia State University recommended the ABI/INFORM Collection, Business Source Complete, and EconLit as top business content databases accessible through the electronic library. I added the EBSCOhost general search to pick-up additional items that may not have appeared in the databases, but with taking a chance that the references may not have much business relevance. As the broader focus of this research is BIAs in the United States, I

used location as a filter; but I note that the goal of this filter is to capture publications that studied incubators or accelerators in the U.S., not to eliminate foreign journals. Regarding data range, I began with the year of 2005, based upon that being the year that accelerators began to emerge in the United States. Lastly, I selected peer-reviewed and scholarly-reviewed publications for the benefits of academic oversight in the quality of the research. I note that a different BIA literature search strategy, such as a variant on the search string and filters, will yield different results; but I do believe this to be a representative sample of extant literature to garner directional trends.

From the literature review, I highlight five key observations:

- Over the last 12 years, the academic conversation has been steady but recently growing. In the four-year period of 2006 to 2009, there were 22 publications. In the next four-year period of 2010 to 2013, the number of publications remained mostly unchanged at 23 publications. In the last four-years of 2014 to 2017, the number of publications rose to 38 publications.
- The publications are spread out amongst many journals. The 89 publications distributed across 64 journals. The top two publishing journals were Economic Development Journal and Entrepreneurship: Theory & Practice, with six and four publications respectively. Between the two journals, Entrepreneurship: Theory & Practice has the more recent articles.
- The publications have a large focus on universities with at least a third of the articles referencing them. Many of these references discuss connections to technology transfer or utilizing connections to university incubators (or affiliations) to garner participants for the research. The reason for this may be

related to ease of access for authors (i.e., professors, students) to university-related connections.

- The BIA terminology references are business incubators and incubation, less around business accelerators and acceleration. The reason for this is unclear especially given the post-2005 review focus. It may be related to the hybrid-effect discussed earlier, where some authors may not be distinguishing a difference; or simply are not yet focused on accelerators.
- The publication topics are fragmented and lack prevailing theories. I group some of the most recent topics as follows: 1) university programs, support and technology transfer 2) access to investment through BIAs, 3) geographic distribution of BIAs especially beyond top hubs such as Silicon Valley, 4) the type and impact of resources (i.e. networks, knowledge) provided by BIAs, 5) start-up of, management of and models for BIAs, 6) characteristics and behaviors of entrepreneurs within BIAs, 7) corporate programs and support, 8) cross-country comparisons to U.S. BIAs, and 9) government policies impacting BIAs.

As noted, my deep-dive literature review focused on literature relevant to the United States due to my research scope. To garner a more general context, I reviewed other systematic literature studies that investigated BIAs from a global or non-U.S. view. Two such exemplary articles with an international focus are “Technology Business Incubation: An overview of the state of knowledge” by Mian, Lamine, and Fayolle (2016) and “A bibliometric analysis of international impact of business incubator” by Gema Albort-Morant and Domingo Ribeiro-Soriano (2016). These publications allude to a similar sense of literary fragmentation. Both of these exemplary reviews are recent; for a historical article that authors frequently reference for

its in-depth literary review is “A systematic review of business incubation research” by Sean M. Hackett and David M. Dilts (2004).

II.2.1 Literary Question – Impact on Startup Performance?

Before going into research framework, I take a moment to return to the bigger question at hand. As I review the extant literature, one key focus area is assessing whether there is scholarly alignment on the impact of incubator and accelerator on startup performance. For example, Hallen and co-authors (2014) ask a similar question when they say “...despite the rapid proliferation of the accelerator form and accelerator program claims of accelerating the development of new ventures, theoretical and empirical questions remain about the efficacy of these programs.” As another example, Fetcher (2015) asks a similar question about incubators when she states “ But are they effective? After examining more than 35 academic articles, including a review paper that systematically examined 38 studies, key takeaways from the literature show that incubators might not prove more effective at creating successful businesses than unincubated businesses.”

To answer this question, Frank J. Van Rijnsoever and his co-authors (Van Rijnsoever, Van Weele, & Eveleens, 2017) sum it up well when they say “...some studies suggest that incubators have a positive impact on the performance of start-ups (Stokan et al., 2015), others have found the impact of incubators to be nonexistent (TamASy, 2007) or even negative (Schwartz, 2013).” It is a mixed bag especially when you attempt to distinguish between incubators and accelerators. Part of the answer is that it depends on the factor of analysis or context. For example, one contextual performance measure is firm survival rate. The five-year survival rate of U.S. new companies in 2014 was 48.7% (Fairlie, Morelix, Tareque, Russell, & Reedy, 2016). In contrast, several “studies have found considerable evidence linking incubation

to greater firm survival. C. Campbell's (1988) study found that only 13.9% of businesses failed during incubation, Lyons's (1990) survey put that proportion at about one third, and H. Sherman and Chappell's (1998) stakeholder analysis found that only 27.2% failed. Phillips (2002) estimates that the business survival rate of firms in technology incubators was 85%, including firms that had already graduated. (Stokan et al., 2015)" From a different angle, another study found that "incubators have a positive effect on (1) the amount of funding that start-ups attract and (2) the ability of start-ups to attract funding from formal investors and banks. (Van Rijnsoever et al., 2017)" In another recent study, Eric Stokan and his co-authors (2015) state that their "analysis indicates that incubators have a significant positive impact on firm job creation, and this impact is not reduced if a matched comparison group is used. Furthermore, this study finds that incubated firms receive five times as many business services (legal, financial, marketing, etc.) as their nonincubated cohort." In summary, though there is a debate, generally the research tends to be positive of the impact of BIAs.

In my research, I seek to contribute to this mainstream as well as academic conversation about the efficacy of business incubators and accelerators. I target learning from the entrepreneurs, the first-hand users, to understand from their vantage point whether business incubators and accelerators are worthwhile investments toward improving their business outcomes and enhancing their entrepreneurial experience; are they making an impact? Going directly to the entrepreneurs to understand their experiences adds a dimension of learning about BIA effectiveness beyond raw output measures (i.e., jobs created, capital raised) of an incubator's or accelerator's portfolio; these metrics are important, but one may lose the bigger picture. A positive incubator or accelerator experience for entrepreneurs may benefit society in many ways, such as inspiring and improving the odds of future business concepts, beyond the

ones incubated or accelerator at a point in time. Also, if the experience is worthwhile, then users may endorse BIAs, thus planting the seeds for future entrepreneurs to utilize incubators or accelerators to bring forth their new business concepts; fueling business dynamism. As some authors have noted, energy may be better spent recognizing what aspects of the BIA offerings are a success and how to improve upon factors that enable them to deliver even greater value to entrepreneurs. Thus, in this research, I also study variables that may contribute to understanding how BIAs provide value, utilizing resource-based and task cost theories.

III RESEARCH FRAMING AND METHODOLOGY

III.1 Research Question

As introduced earlier, the goal of this research is to answer the following research questions:

To what extent do entrepreneurs value business incubators and accelerators?

And what contributes to this value?

Regarding value, I explore three types of value, namely the overall outcome value (i.e., does their business progress), recommendable value (i.e., would they recommend the program to others) and experience value (i.e., was the experience valuable regardless of business outcome). As a background concept, I explore the difference between incubators and accelerators, but with a sense of caution given the emerging hybrid concept discussed earlier.

III.2 Research Population

The target population is as follows:

- Entrepreneurs that are currently using a U.S. based business incubator or accelerator, and
- Entrepreneurs that have previously used a U.S. based business incubator or accelerator.

The national view is warranted as per Ian Hathaway (2016), who states “while well-established regions such as San Francisco-Silicon Valley, Boston-Cambridge, and New York account for the lion’s share of startup activity and funding, significant evidence suggests that a non-trivial amount of early-stage capital is dispersing geographically throughout the United States.” Also, I primarily concentrate on business incubators and accelerators that are technology-focused, and I attempt to target founders that seem to have attended a BIA within the last five years for memory recency.

III.3 Research Approach

This research is exploratory, and I conduct it as an empirical field study. The goal of exploratory research methods is to search for significant “patterns in the data in case there is no or only little prior knowledge on how the variables are related” or “explore whether additional independent variables prove valuable for extending the concept being tested” (Hair, 2014).

Exploration typically involves determining which “independent variables are statistically significant predictors of the single dependent variable and then which independent variables are, relatively speaking, better predictors of the dependent variable” (Hair, 2014). In doing this exploration, the researcher analyzes the “relationships between the variables in an effort to reduce a large number of variables to a smaller set of composite factors” (Hair, 2014).

The primary focus of this exploratory research is a quantitative analysis of a theoretical variance model to identify statistically significant predictive variables of entrepreneur’s perceptions of the value of BIAs programs. This investigation targets an understanding of what contributes to (i.e., influences) value for the entrepreneurs. Secondarily, I focus on driving more in-depth knowledge of the dependent variable, namely, program value through qualitative analysis and additional quantitative analysis.

III.4 Primary - Method, Models, Hypotheses, and Variables

III.4.1 Method

“Social Science researchers have been using statistical analysis tools for many years to extend their ability to develop, explore and confirm research findings. Application of first-generation statistical methods such as factor analysis and regress analysis dominated the research landscape through the 1980s. But since the early 1990s, second-generation methods have expanded rapidly, in some disciplines, represent almost 50% of the statistical tools applied in

empirical research” (Hair, 2014). “One of the emerging second-generation is referred to as partial least squares structural equation modeling (PLS-SEM)” (Hair, 2014). This multivariate data analysis tool is becoming increasingly popular and necessary in the social sciences disciplines as researchers seek “to comprehend more complex relationships” (Hair, 2014). The method focuses on the prediction of a specific set of hypothesized relationships that maximizes the explained variance in the dependent variable, similar to OLS regressions” (Hair, 2014). The distinction is that “while being a regression-based approach, PLS-SEM is non-parametric in nature. This means that it does not make any assumptions regarding the distribution of the data, or more precisely, the residuals, as is the case in regression analysis (Sarstedt & Mooi, 2014)” (Hair, 2014). “Multivariate analysis involves the application of statistical methods that simultaneously analyze multiple variables” (Hair, 2014). PLS-SEM lends itself well to complex multivariate data analysis of unobservable constructs with the primary intent of exploration for theory development (Hair, 2014).

For this research, I examine the research questions primarily using an exploratory variance model. To analyze the model, I select partial least squares structured equation modeling (PLS-SEM) method using SmartPLS 3 software (Ringle, 2015). Additional quantitative tools I use are MS Excel (Microsoft, 2016) and IBM SPSS (IBM, 2016) for data cleaning as well as simple descriptive statistics and charting.

III.4.2 Path Model

The path model is a “diagram that illustrates the research hypotheses and displays the variable relationships that will be examined” (Hair, 2014). It “enables researchers to organize their thoughts and visually consider the relationships between the variables of interest” (Hair, 2014). “Path models are made up of two elements: (1) the structural model (i.e. inner model),

which describes the relationship between the latent variables, and (2) the measurement models (i.e. outer model), which describe the relationships between the latent variables and their measures (i.e. their indicators)" (Hair, 2014).

III.4.3 Structural Model

III.4.3.1 Constructs

I begin by introducing the constructs in the structural model. Figure 5 shows a visual overview of the constructs to provide a perspective of the independent and dependent variables. I present the actual structural model in a later section.

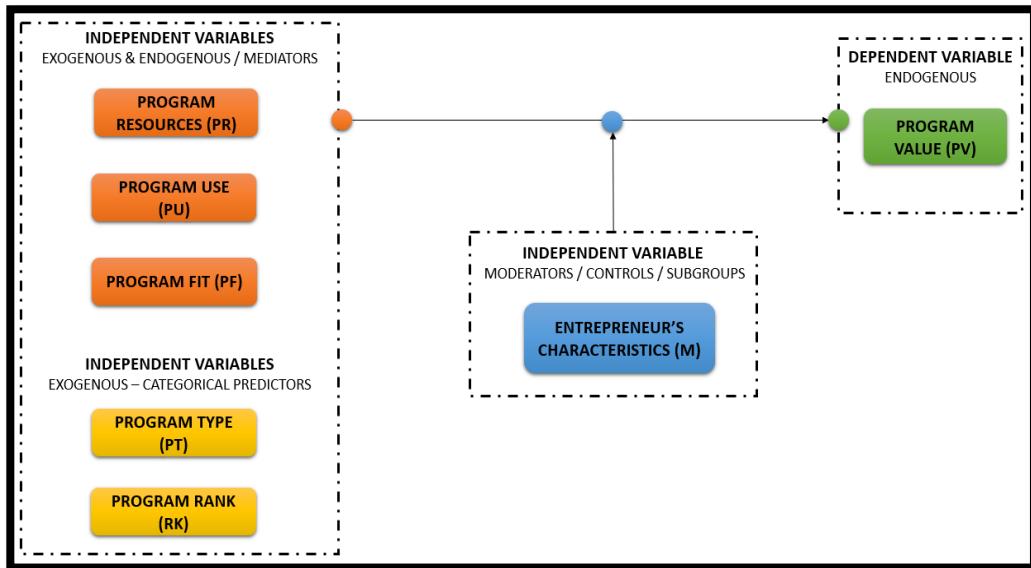


Figure 5 Overview of Constructs for the Structural Model

Overall, there are seven, first-order constructs. I will outline each, then follow-up in a later section to detail their measures. In the model, there is one dependent construct, PROGRAM VALUE (PV). It represents the entrepreneur's view of the value of using an incubator or accelerator program. I split the six independent constructs into three groups for explanation and as a precursor view of how I analyze them:

- The first group consists of three independent variables that are PROGRAM RESOURCES (PR), PROGRAM USE (PU), PROGRAM FIT (PF). These variables all have multiple metric measures as I will detail in the measurement indicators section. These constructs are a mix of exogenous and mediator (endogenous) variables.
 - PROGRAM RESOURCES (PR) construct represents the entrepreneur's view of the impact of the incubator's or accelerator's program resources on progressing the entrepreneur's business.
 - PROGRAM USE (PU) construct describes the entrepreneur's view of the level of effort associated with using the incubator's or accelerator's program.
 - PROGRAM FIT (PF) construct describes the entrepreneur's view of their fit to or within the incubator's or accelerator's program.
- The second group consists of two independent variables, namely, PROGRAM TYPE (PT) and PROGRAM RANK (RK). These variables are both categorical predictors that I represent through dummy variables (binary data) within the model.
 - PROGRAM TYPE (PT) variable represents whether the program is an incubator versus an accelerator.
 - PROGRAM RANK (RK) variable represents whether the incubator or accelerator is a top-ranked program.
- The third group consists of moderator variables. In the structural model analysis, I consider only one variable at a time as an ENTREPRENEUR'S CHARACTERISTICS (M) to understand any individual potential subgroup differences; so effectively one construct. I represent it in this manner for parsimony.

Thus, I do not contemplate effects or interactions amongst individual moderators; I only consider how they individually moderate between the dependent variable and the other independent variables. The moderators consist of various items that characterize the entrepreneur's experiences, demographics, and business. I provide additional details in the measurement indicators section.

III.4.3.2 Model Diagram & Model Equations

Now that I have described the constructs, I detail the structural model. The key elements of a structural model are “the sequence of the constructs and the relationships between them” (Hair, 2014). “The sequence of the constructs in a structural model is based on theory, logic or practical experiences observed by the researcher” (Hair, 2014). Figure 6 shows the hypothesized sequence of the constructs and the relationship between them for my exploratory structural model.

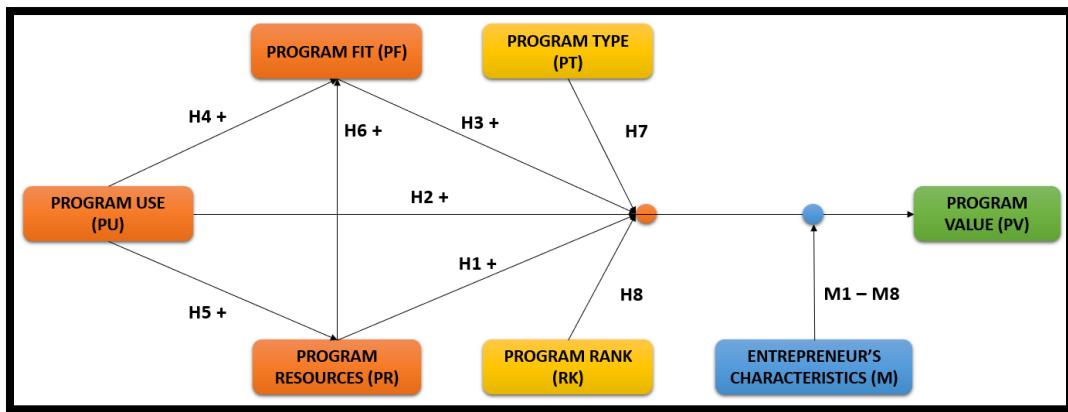


Figure 6 Exploratory Structural Model

As expected with an exploratory model, there are many proposed relationships. As discussed earlier, exploration typically involves determining which “independent variables are statistically significant predictors of the single dependent variable and then which independent

variables are, relatively speaking, better predictors of the dependent variable” (Hair, 2014). In doing this exploration, the researcher analyzes the “relationships between the variables in an effort to reduce a large number of variables to a smaller set of composite factors” (Hair, 2014).

The associated variance model equations are as follows:

- Mediators: $PF = a(PU) + z_{pf}$; $PR = b(PU) + z_{pr} + c(PF) + z_{pr2}$
- Main Effects (with Moderators and Mediators):

$$PV = g_1(M) + g_2(PU) + g_3 [(PU) [M]] + g_4(PF) + g_5 [(PF) (M)] + g_6(PR) + g_7 [(PR) (M)] \\ + g_8(PT) + g_9 [(PT) (M)] + g_{10}(RK) + g_{11} [(RK) (M)] + z_{pv}$$

III.4.3.3 Hypotheses

As Figure 6 (above) frames up, there are eight primary hypothesized relationships (H1 – H8) without the moderators. For parsimony in this display as well as in the analysis, the moderators (M1-M8) are group together as one representative hypothesis (H9). Table 3 displays a descriptive summary of the hypotheses.

Table 3 Hypotheses Summary

Hypothesis	Description
H1	Positive relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV)
H2	Positive relationship between PROGRAM USE (PF) and PROGRAM VALUE (PV)
H3	Positive relationship between PROGRAM FIT (PF) and PROGRAM VALUE (PV)
H4	PROGRAM FIT (PF) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV)
H5	PROGRAM RESOURCES (PR) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV)
H6	PROGRAM FIT (PF) will positively mediate the relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV)
H7	Relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV)
H8	Positive relationship between PROGRAM RANK (RK) and PROGRAM VALUE (PV)
H9	Relationship between (each) ENTREPRENEUR'S CHARACTERISTICS (M1 – M8) and PROGRAM VALUE (PV)

Below, I provide additional details about each hypothesis, beginning with the core constructs in the structural model (i.e., non-moderators):

H1: There will be a positive relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV).

Description: One of the premises of the resource-based theory is that performance of an entity differs based on its resources (Miles, 2012). The theory focuses on efficiency-based differences and how companies compete with other businesses based on their access to resources and capabilities (Miles, 2012). In line with the theory, my structural model hypothesizes that the entrepreneur will perceive positive value (i.e., a business advantage) through the access to resources that positively impact their business.

H2: There will be a positive relationship between PROGRAM USE (PF) and PROGRAM VALUE (PV).

Description: This hypothesis relates to the Task Effort Cost Theory. This theory frames that there is a cost dimension to a task. In this case, the entrepreneur must put forth the effort to the use (i.e., participation in) an incubator or accelerator program. If the benefits of the use outweigh the effort, the entrepreneur should find value in the program. So, this exploratory relationship hypothesizes that if the entrepreneur has a positive perception of the level of effort (i.e., easy, reasonable, expected) associated with the use of the incubator's or accelerator's program, the person will value the incubator's or accelerator's program.

H3: There will be a positive relationship between PROGRAM FIT (PF) and PROGRAM VALUE (PV).

Description: This exploratory relationship hypothesizes that an entrepreneur's positive perception about the program fit will positively predict the entrepreneur's perceptions of the incubator's or accelerator's value. This relationship is a variant of culture.

H4: PROGRAM FIT (PF) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV).

Description: This exploratory relationship hypothesizes that an entrepreneur's positive perception about the program fit will positively intervene between the entrepreneur's view of the level of effort associated with using the incubator's or accelerator's program and the entrepreneur's perceptions of value.

H5: PROGRAM RESOURCES (PR) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV).

Description: Similarly, this exploratory relationship hypothesizes that an entrepreneur's positive perception about the impact of program resources will positively intervene between the entrepreneur's view of the level of effort associated with using the incubator's or accelerator's program and the entrepreneur's perceptions of value.

H6: PROGRAM FIT (PF) will positively mediate the relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV). Note that PROGRAM USE (PU) is the exogenous variable starting this relationship (i.e., beginning the path).

Description: This exploratory relationship hypothesizes that an entrepreneur's positive perception about the program fit will positively intervene between the impact of program resources and the entrepreneur's perceptions of value.

H7: There will be a relationship between PROGRAM TYPE (PF) and PROGRAM VALUE (PV).

Description: Entrepreneurs may indicate different levels of value depending on whether the attended program is at an incubator versus an accelerator. I do hypothesize a direction of this relationship due to a lack of basis.

H8: There will be a positive relationship between PROGRAM RANK (RK) and PROGRAM VALUE (PV).

Description: Whether a program is top-ranked influences the perceived value of the incubator or an accelerator. Based on the literature, it is perceived entrepreneurs will find greater value from top-ranked programs.

Moving on to explore more of the structural model, I explain the hypothesized moderating variables. “Referred to as a moderator effect, this situation occurs when the moderator (an independent variable or construct) changes the strength or even the direction of a relationship between two constructs in the model” (Hair, 2014). The overall hypothesis is that each moderator will have a moderating effect on the relationship between the dependent variable, PROGRAM VALUE (PV) and one of the independent constructs. I state the summary hypothesis as follows:

H9: There will be a relationship between (each) ENTREPRENEUR’S CHARACTERISTICS (M) and PROGRAM VALUE (PV).

Description: In the structural model analysis, I consider only one moderating variable at a time as represented by ENTREPRENEUR’S CHARACTERISTICS (M). The parsimonious goal is to understand individual subgroup differences.

There are eight hypothesized moderators, M1 through M8, related to the

entrepreneur's experiences, demographics, and business. They are single item variables and are a mix of metric and categorical measures. They are as follows:

- M1: Entrepreneur's Educational Experience (i.e., grade completed; ordinal data)
- M2: Entrepreneur's Age (continuous data)
- M3: Technical Level of Entrepreneur's Business (ordinal data)
- M4: Entrepreneur's Status as a Current or Past User of the BIA (binary data)
- M5: Entrepreneur's Gender (binary data)
- M6: Entrepreneur's Business Experience (i.e., prior to use of BIA; binary data)
- M7: Entrepreneur's Race (binary data)
- M8: Entrepreneur's Previous Experience with BIAs (i.e., use of multiple BIAs; binary data)

III.4.4 Measurement Models

“The structural model describes the relationship between latent variables (constructs). In contrast, the measurement models represent the relationships between constructs and their corresponding indicator variables” (Hair, 2014). Like Figure 6, I show Figure 7 to introduce a visual overview of the indicators for the independent and dependent variables. I present the actual measurement models in a later section.

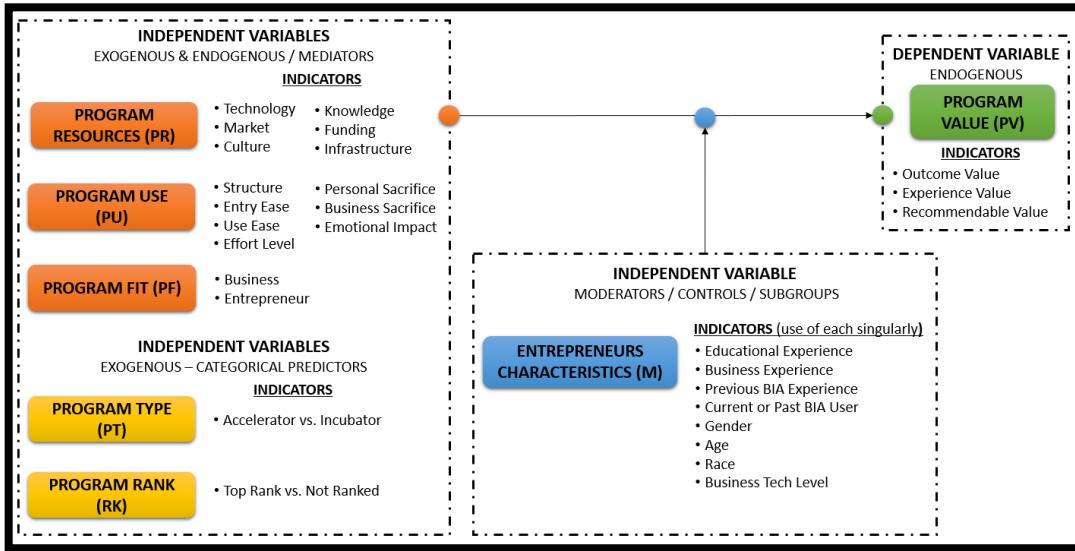


Figure 7 Overview of Constructs with Measurement Indicators

III.4.4.1 Indicator Variables

Starting again with the dependent construct; the PROGRAM VALUE (PV) variable comprises three formative indicators (more precisely, composite indicators). These hypothesized indicators are as follows:

- Outcome Value: Entrepreneur's rating of the value of the incubator or accelerator program toward improving outcomes for their business. The measure is on 5-point (assumed equidistant) ordinal scale.
- Experience Value: Entrepreneur's rating of the value of the program experience regardless of whether their business survives. The measure is on 7-point (assumed equidistant) ordinal scale.
- Recommendable Value: Entrepreneur's rating of business value through their willingness to recommend the incubator or accelerator program to fellow entrepreneurs. The measure is on 7-point (equidistant) ordinal scale.

Moving on to the independent variables, PROGRAM RESOURCES (PR) has six hypothesize formative indicators. These indicators are the entrepreneurs rating as to the impact of the incubator's or accelerator's program resources on progressing their business. The measure is on a 5-point ordinal scale (note - biased scale because it allows for one negative response in an attempt for completeness; will investigate results data for impact). The PROGRAM RESOURCES (PR) indicators are as follows:

- Knowledge Resources: classes, seminars, mentors, coaches, experts, and the like
- Funding Resources: sources of seed funding through investors and financial institutions
- Infrastructure Resources: office space, meeting rooms, software, administrative services, and the like
- Technology Resources: innovation, labs, intellectual property, researchers, and the like
- Market Resources: customers, corporations, suppliers, employees, and the like
- Culture Resources: entrepreneurial environment, like-minded network, emotional support, and the like.

The next independent variable, PROGRAM USE (PU) has seven hypothesize formative indicators. These indicators are as follows:

- Structure: Entrepreneur's rating of how structured the program is. The measure is on 5-point (assumed equidistant) ordinal scale.
- Entry Ease: Entrepreneur's rating on ease of entry into the program. The measure is on 7-point (assumed equidistant) ordinal scale.

- Use Ease: Entrepreneur's rating on ease of using resources after entering the program. The measure is on 7-point (assumed equidistant) ordinal scale.
- Effort Level: Entrepreneur's rating on how much effort to engage in activities and requirements of the program relative to what they expected; relates to task cost theory. The measure is on 7-point (assumed equidistant) ordinal scale.
- Personal Sacrifice: Entrepreneur's rating of the sacrifice of personal time, family and other activities to use the program relative to what they expected; relates to task cost theory. The measure is on 7-point (assumed equidistant) ordinal scale.
- Business Sacrifice: entrepreneur's rating of the sacrifice of other business opportunities or alternatives to use the program relative to what they expected; relates to task cost theory. The measure is on 7-point (assumed equidistant) ordinal scale.
- Emotional Impact: entrepreneur's rating of the level of stress to use the program relative to what they expected; relates to task cost theory. The measure is on 7-point (assumed equidistant) ordinal scale.

The next independent variable, PROGRAM FIT (PF) has two hypothesize formative indicators. These indicators are as follows:

- Business Fit: Entrepreneur's rating of how well the entrepreneur's business fit (i.e., industry focus, aligned expectations) to the incubator or accelerator program. The measure is on 5-point (assumed equidistant) ordinal scale.
- Entrepreneur Fit: Entrepreneur's rating of how well the entrepreneur fit (i.e., cultural fit, aligned expectations) to the incubator or accelerator program. The measure is on 5-point (assumed equidistant) ordinal scale.

All remaining indicators for the outstanding independent variables are single-item measures. In this case “the construct and item are equivalents” (Hair, 2014). In summary, Figure 8 displays the measurement models containing all the indicators and their direction.

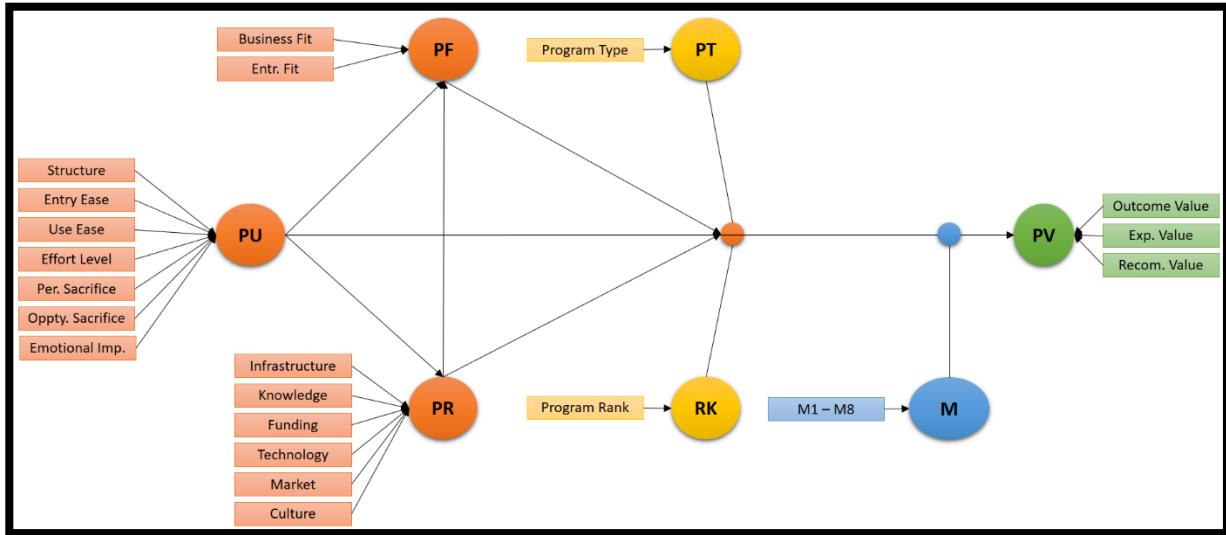


Figure 8 Inner and Outer Models Diagram

Note that all indicators are either formative or single-item; there are no reflective indicators. This format is noteworthy for the analysis of the PLS-SEM model. Also, note that “as PLS-SEM is robust against measurement error, use of binary variables in formative models is widely accepted. For the same reason, use of ordinal indicators is commonly accepted (Henseler, Ringle, & Sarstedt, 2012: 266). In SmartPLS 3 nominal variables must be implemented as a series of dummy variables, or a nominal variable can be the grouping variable for multigroup PLS” (Garson, 2016). The PLS-SEM algorithm method works “well with ordinal scales with equidistant data points (i.e., quasi-metric scales; Sarstedt & Mooi, 2014)” (Hair, 2014). When the ordinal scale is not equidistant, it introduces possible bias (Hair, 2014). Formative

measurement models are “also referred to as Mode B measurement in PLS-SEM” (Hair, 2014).

For PLS-SEM formative measurement model, I am presuming composite instead of causal indicators; in social sciences research viewing the measurement as an approximation in this manner seems more realistic (e.g., Rigdon, 2014b) (Hair, 2014).

III.5 RESEARCH SAMPLE SIZE, SAMPLING, AND DATA COLLECTION

III.5.1 *Sample Size*

As mentioned, the primary analysis method is PLS-SEM using SmartPLS 3 software (Ringle, 2015). Given this analysis method, I use a calculator provided by Dr. Daniel Soper (2018), namely, the a-priori sample size calculator for SEM, to determine minimum sample size. The inputs are an expected effect size of 0.3, a probability level of 0.05, a desired statistical power of 0.8, seven latent variables, and 21 observed variables. The calculator outputs the minimum recommended sample size to detect effect size is 170, and minimum sample size for the model structure is 200.

III.6 Sampling

The primary sampling method is purposive. I randomly select BIAs across the United States from reputable websites such as Global Accelerator Network (GAN, 2017) and International Business Innovation Association (INBIA, 2016) as well as general web searches. Most of the sites indicate the focus of the BIAs. Thus I use these indicators to slant my selection toward technology-focused BIAs. I locate the sample (i.e., entrepreneurs) through publicly available company directories posted on these BIAs websites. The websites typically provide a list of current companies participating and previous companies that have participated in their incubator or accelerator programs. Along with the company name, the website may provide additional details such as company website link, company founders or email addresses.

Typically, there is enough initial data to inform further research of the company or its founder(s), supplemented by LinkedIn and other web searches, to attempt to contact founders even if their business is no longer in operation.

An additional sampling method is by referral. Participants in the research can voluntarily provide a permission introduction to colleagues. Also, when participants connect via LinkedIn, the LinkedIn search algorithms automatically recommends colleagues. When these colleagues seem applicable, such as listing themselves as company founders or citing the use of an incubator or accelerator, I invite them to participate in the research. As LinkedIn typically shows pictures, this referral method presents an opportunity to attempt to slightly boost sample for women and racial minorities that I expect to be low in the target population.

III.6.1 Data Collection Process

The primary data collection method is a questionnaire administered via the online survey tool, Qualtrics (2018). Each invited study participant receives an introductory message explaining the research purpose and a survey link via email, their company's online form or LinkedIn mail (if voluntarily connected). I track each invited participant in an Excel spreadsheet as a method for monitoring response rates. To increase survey completions, I send follow-up correspondence as a reminder request to complete the questionnaire. I serially request and collect responses until I meet at least sample size minimums within the target population; this is a three-month period.

To participate in the survey without being screened out, each respondent must be an entrepreneur as well as be at least 18 years of age and graduated from high school or its equivalent. I place the age and education restrictions to increase the likelihood of comprehending the questionnaire content.

I designed the questionnaire to be 15 minutes or less, as projected by the Qualtrics (2018) estimation algorithm, to minimize participant response fatigue. It varies in length and content based upon respondent's population type. For most of the target sample, the survey is 47 questions that are a mix of pre-determined ordinal or ratio selections as well as open-ends. I validated the content and usability of the questionnaire before use by having six testers take the survey; the testers consisted of business owners, a previous BIA user, a professional researcher and someone unfamiliar with the topic. Though the primary purpose of the survey is to gather the data necessary for the quantitative model analysis, there are additional quantitative and open-ended questions to collect deeper insights. See the appendix to view a summary of the questionnaire.

In addition to the primary data, I collect secondary data for use in my variance model and analysis. I research the list of incubators and accelerators identified by survey respondents to ensure legitimacy and triangulation. Upon affirmation, I gather characteristics about the BIAs to use as variables in the analysis. I capture this secondary data about the BIAs from their respective websites and other reputable websites, inclusive of Global Accelerator Network (2017), UBI Global (2017), Crunchbase (2018), Seed Accelerator Rankings Project (Hochberg, Cohen, & Fehder, 2017), and Investopedia (Seth, 2015).

III.7 Secondary – Method for Deeper Insights

As mentioned earlier, beyond the variance model evaluation, I seek to dig deeper into understanding PROGRAM VALUE (PV) through supplemental survey questions. This analysis further explores one of the base research questions of “**to what extent do entrepreneurs value business incubators and accelerators?**” Specifically, I use quantitative methods (i.e., such as independent sample means t-test) to analyze respondent answers to questions related to outcome

value and recommendable value questions. Then I use qualitative methods to evaluate respondent answers to open-end questions about what was ‘most valuable’ as well as ‘unrealized value’ from participating in the BIA programs. Other than differences in analysis method, all other aspects of the research design (i.e., sample size, data collection) remain the same. For the responses to open-ended questions, I use NVivo 11 software (QSR-International, 2017) for qualitative analysis. For the analysis of quantitative analysis, I return to usage of SmartPLS 3 software (Ringle, 2015) as well as SPSS software (IBM, 2016).

IV ANALYSIS AND RESULTS

IV.1 Data Collected And Validation Analysis

In this section, I detail the responses collected and procedure I use to clean-up and check the data to ensure it is suitable for path model analysis.

IV.1.1 Responses

During the collection period, I invite business founders from 1008 companies to participant in the survey. I collect 349 completed questionnaire responses; a 35% response rate.

IV.1.2 Data Validation

To clean-up and validate the data to establish the final cases for PLS-SEM analysis, I analyze the data for (1) presence within target population, (2) excessive missing data within case and for indicators, (3) suspicious response patterns, (4) outliers, and (5) distribution, namely skewness and kurtosis. I use MS Excel (Microsoft, 2016), IBM SPSS (IBM, 2016) and SmartPLS 3 (Ringle, 2015) for this examination. After completing this process, of the 349 responses, 271 remain in the final data set; a response rate of 27%, The 271 responses exceed the 200-minimum sample size for the model structure.

I highlight the techniques I use to clean-up and validate the data:

- Within Target Population Screen: Entrepreneurs that are currently using or have previously used a U.S. based business incubator or accelerator.
- Missing Data Examination: For PLS-SEM, there are two primary rules of thumb, especially in the social sciences research, for examining and treating missing data. They are as follows: For an individual case, overall, missing data should not exceed 15%; otherwise, remove the observation. Individuals indicators should not exceed more than 5% missing values. For those missing values of 5% or less, consider using

mean value replacement (Hair, 2014). I mark data as -99 in the dataset so that it stands out for easy identification.

- Suspicious Response Pattern: This involves case by case review looking for such patterns as straight lining. The variability in the question types within the questionnaire minimizes this, but I review for excessive patterning.
- Outliers: “An outlier is an extreme response to a particular question, or extreme responses to all questions” (Hair, 2014). As the questionnaire is online and much of the possible responses are predetermined selections (i.e., ordinal), the potential for outliers is minimal and easy to identify.
- Distribution: “PLS-SEM is a non-parametric statistical method”; “it does not require the data to be normally distributed” (Hair, 2014). Nevertheless, I examine the distribution for extreme kurtosis and skewness to understand the nature of the data (e.g., review for cases in which all answers are 5).

IV.1.3 Representativeness

I review the final target dataset, 271 cases, to look for reasonable national representativeness and diversity for the BIAs and entrepreneur demographics. I use MS Excel (Microsoft, 2016) and IBM SPSS (IBM, 2016) for this analysis.

For the BIA analysis, I identify that there are 78 incubators and accelerators in the dataset. The median founding year of the BIAs is 2011. There is a skew in the data, with 75% of the BIAs being accelerators. I would have expected the ratio to be the opposite given the large population of incubators. There must have been an unexpected pattern in the amount of readily available references to accelerators. Although the unexpected skew is present, the incubator sample size appears to be large enough with 66 cases for analysis as “PLS-SEM works

efficiently with small sample sizes” (Hair, 2014). Turning to national location distribution, I identify that the BIAs are well-distributed across 33 states and four geographic regions as shown in Figure 9.

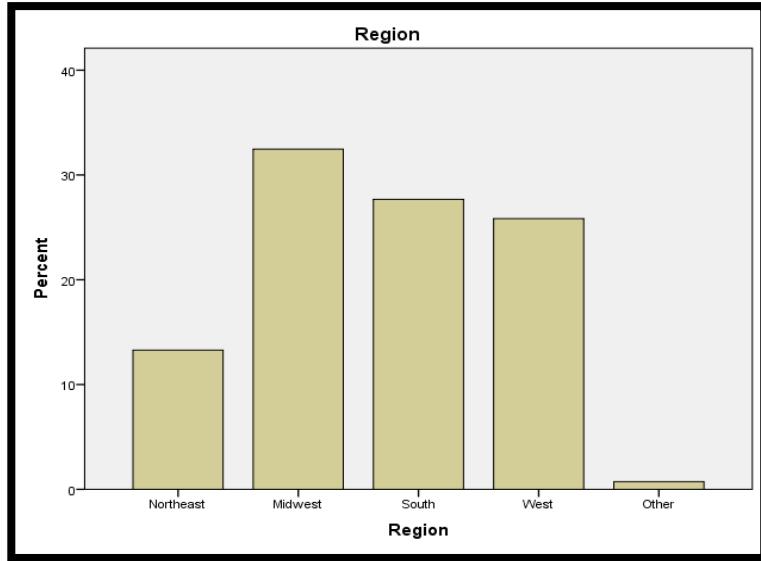


Figure 9 BIAs Regional Distribution

I based the four regional groupings of West, Midwest, Northeast, and South from the United States Census Bureau defined statistical regions (Bureau, 2017); see Figure 10. I note that the Northeast region has the fewest states in the U.S. Census-defined regions (i.e., 9 states in Northeast vs. 17 states in South), driving the lower percentage in the distribution as the data collection process sought to gather responses from each state not region.

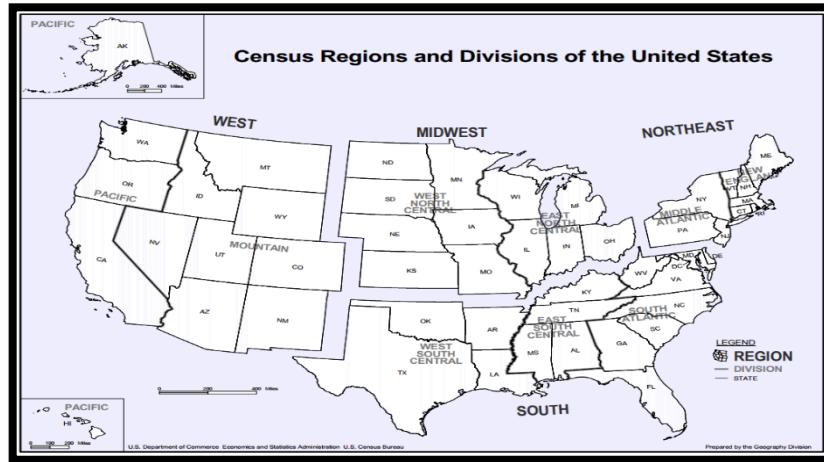


Figure 10 U.S. Census Regions Map

Now, I turn to the distribution of demographics amongst the entrepreneurs. The median age of the entrepreneurs is 38 years old (i.e., born 1979). The entrepreneurs are well-educated, with greater than 85% holding at least a bachelor's degrees; figure 11 shows the educational distribution of the entrepreneurs. According to the United States Census report, Business Ownership by Gender, Ethnicity, Race and Veteran Status (2012), this is much greater than the general population of business owners that is about 50% well-educated. It is not surprising that there is a bias toward well-education entrepreneurs given the expectations of BIA programs, especially those BIAs that are technology focused. Figure 12 aligns with this reasoning as most entrepreneurs list their business products and services as high-tech; which will require higher levels of education.

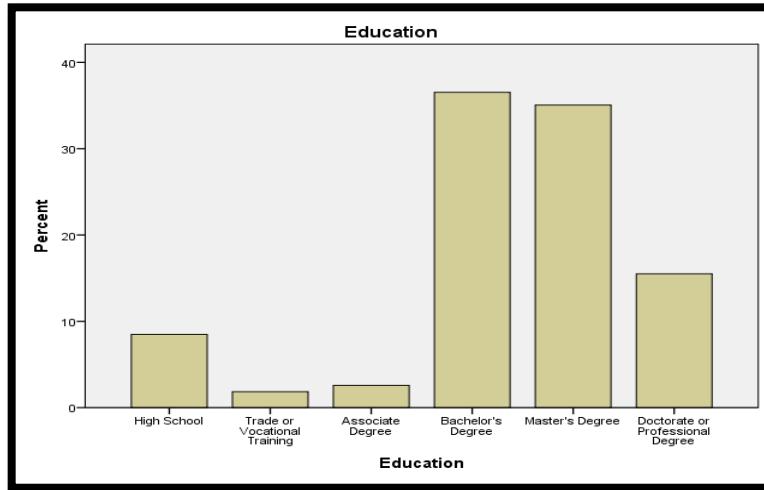


Figure 11 Entrepreneurs Education Distribution

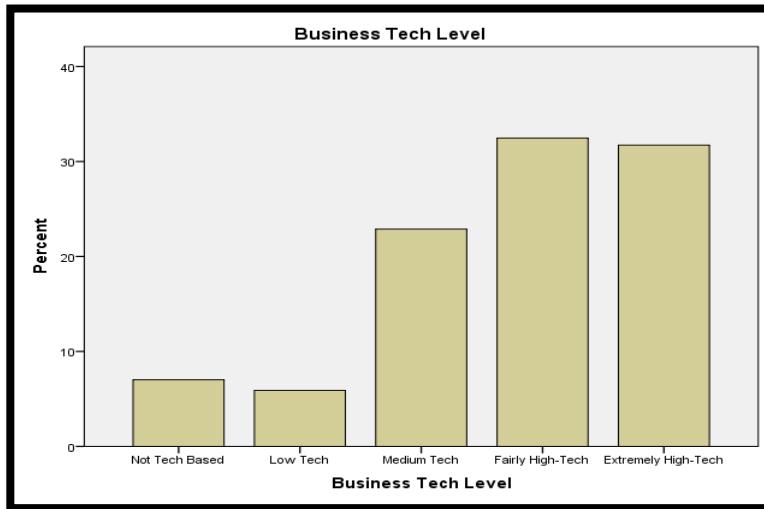


Figure 12 Entrepreneurs Business Technology Level Distribution

Next, I look at race and gender distribution for the entrepreneurs. Figure 13 shows that 70% of respondents classify themselves as white (i.e., non-minority). Though this number is high, as expected, the percent is slightly low in comparison to the census data that shows well-educated white or non-minority between 84% - 88% respectively (Bureau, 2012). This

difference may be due to slight attempts to opportunistically boost minority samples via from LinkedIn referrals as noted in the research sampling process. Figure 14 shows that 32% of respondents are female. This mix reasonably aligns with census data for well-educated business owners, where women are 37% (Bureau, 2012). Overall, for both BIAs and the entrepreneurs, the dataset appears reasonable to move forward with the analysis. I provide additional descriptive statistics and correlations for other variables in other areas of this analysis.

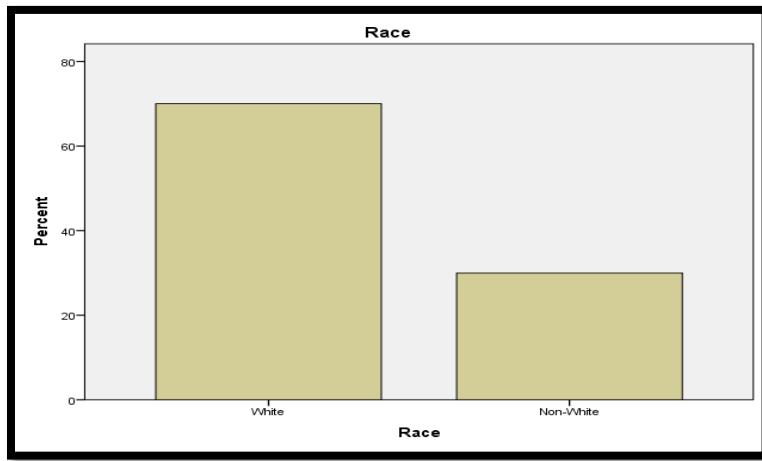


Figure 13 Entrepreneurs Race Distribution

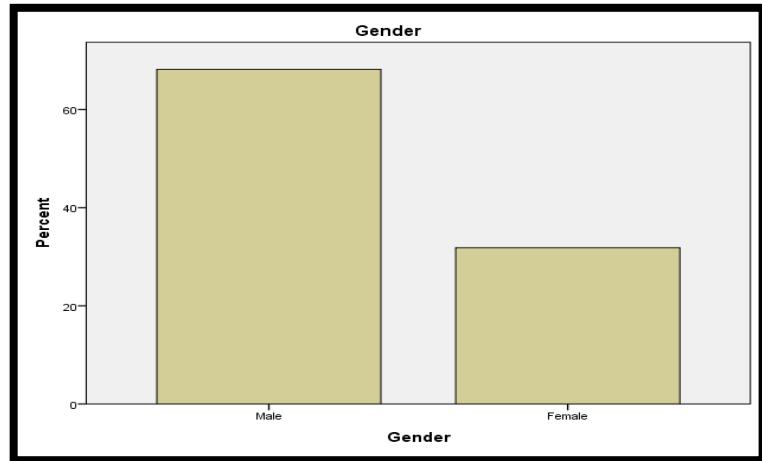


Figure 14 Entrepreneurs Gender Distribution

IV.2 Primary Quantitative Analysis: PLS-SEM

In this section, I detail the analysis of the path model. Specifically, I analyze the measurement models and the structural model. As an overview, here is what I evaluate:

- Measurement Models
 1. Assess formative measurement models for collinearity issues
 2. Assess the significance and relevance of the formative indicators
- Structural Model
 1. Assess structural model for collinearity issues
 2. Assess the significance and relevance (total effects) of the structural model relationships
 3. Assess the level of R-Squared
 4. Assess the f-squared effect size
 5. Assess Mediation effects (indirect effects), and
 6. Assess Moderation effects.

IV.2.1 *Evaluation of Formative Measurement Models*

I begin the PLS-SEM by examining the measurement models. In this case, as noted earlier, we only have formative measurement models and single-item measures. “At the indicator level, the question arises as to whether each formative indicator indeed delivers a contribution to the formative index by representing the intended meaning. There are two situations in which researchers should critically examine whether a particular indicator should be included in the index: First, an indicator’s information could be redundant if it exhibits high correlations with the other indicators of the same construct. This requires examining collinearity among the indicators. Second, a formative indicator may not significantly contribute to the

construct both relative and absolutely. The latter aspects can be assessed by examining the statistical significance and relevance of the formative indicators” (Hair, 2014).

Per this summary, I will use the following steps to assess the measurement models:

1. Assess formative measurement models for collinearity issues
2. Assess the significance and relevance of the formative indicators. (Hair, 2014)

Figure 15 shows the model with constructs and indicators as drawn in SmartPLS 3 (2015) that I will use in this analysis and upcoming sections.

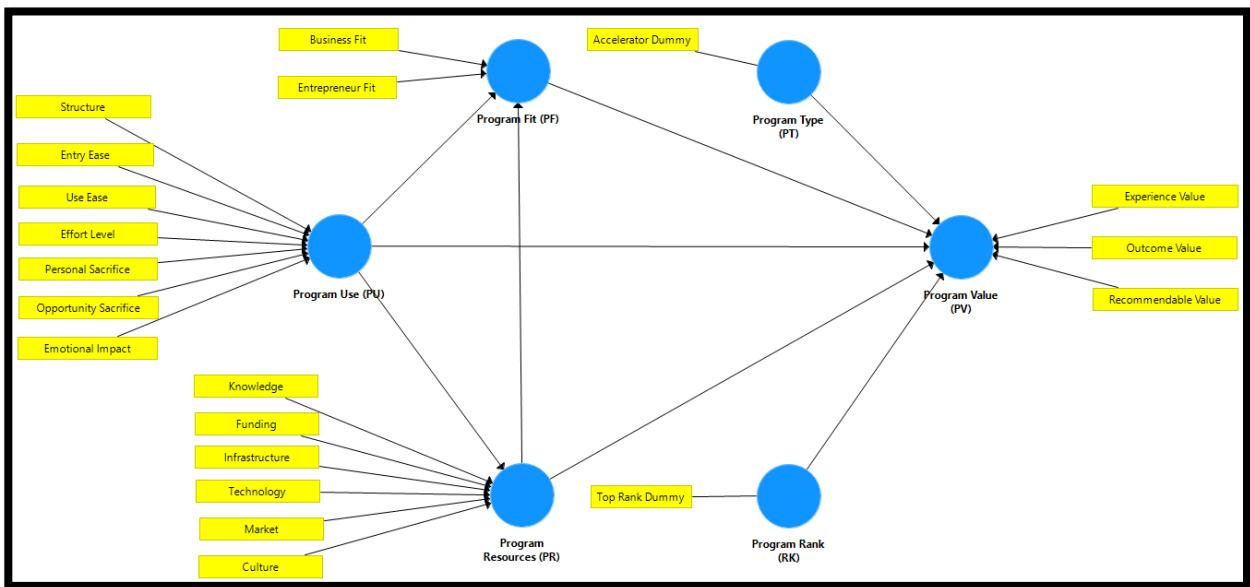


Figure 15 Model with Constructs and Indicators

IV.2.1.1 Assess Measurement Model for Collinearity Issues

To measure collinearity, I assess the variance inflation factor (VIF), which is “defined as the reciprocal of the tolerance (TOL)” (Hair, 2014). “The tolerance represents the amount of variance of one formative indicator not explained by the other indicators” (Hair, 2014). A VIF value of 5 and higher indicates a potential collinearity problem (Hair et al., 2011) (Hair, 2014). “More specifically, an indicator’s VIF level of 5 indicates that 80% of its variance is accounted

for by the remaining formative indicators associated with the same construct”(Hair, 2014). “If the level of collinearity is very high, as indicated by a VIF value of 5 or higher, one should consider removing one of the corresponding indicators” or “combing the collinear indicators into a single (new) composite indicator” (Hair, 2014).

To complete this assessment, I first run the PLS-Algorithm with the settings of (1) Path Weighting Scheme, (2) 300 Maximum Iterations and Stop Criterion of 1.0E-7 as recommended (Hair, 2014). Figure 16 shows the output. As discussed, to assess collinearity, I review the VIFs for the formative indicators. Table 4 shows the Collinearity Statistics (VIF) report, where I examine the Outer VIF Values. All the formative indicators (i.e., ignoring the single-item (dummy) measures as not relevant for this analysis) successfully meet the criteria of a VIF less than 5.0. Thus, I conclude there are not any collinearity problems in the dataset.

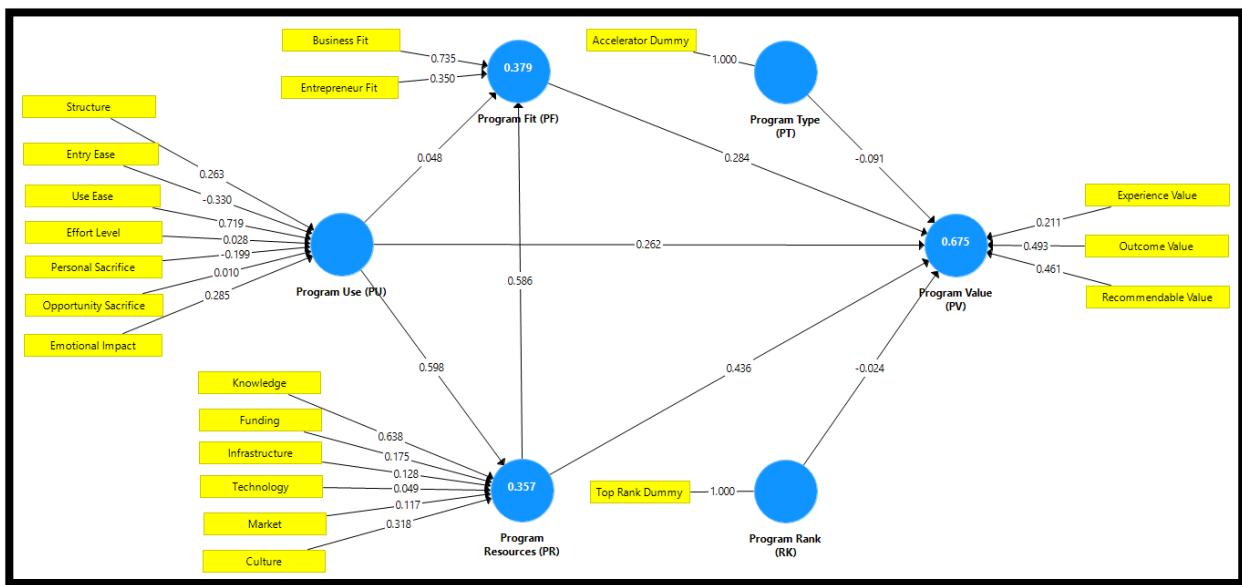


Figure 16 Model after PLS-Algorithm

Table 4 VIF Values for Formative Indicators

	Outer VIF Values	Above 5.0 Threshold
Business Fit	1.75	No
Culture	1.38	No
Effort Level	1.40	No
Emotional Impact	1.72	No
Entrepreneur Fit	1.75	No
Entry Ease	1.15	No
Experience Value	1.44	No
Funding	1.19	No
Infrastructure	1.45	No
Knowledge	1.31	No
Market	1.47	No
Opportunity Sacrifice	1.84	No
Outcome Value	1.83	No
Personal Sacrifice	2.26	No
Recommendable Value	2.10	No
Structure	1.29	No
Technology	1.57	No
Use Ease	1.15	No

IV.2.1.2 Assess Significance and Relevance of The Indicators

Next, I move on to step 2. To assess the significance and relevance of the formative indicators one must examine the outer weights. “The outer weight is the result of multiple regression (Hair et al., 2010) with the latent variable scores as the dependent variable and the formative indicators as the independent variables” (Hair, 2014). “The values of the outer weights are standardized and can, therefore, be compared with each other. They express each indicator’s relative contribution to the construct, or its relative importance to forming the construct” (Hair, 2014). To assess whether “the outer weights in formative measurement models are significantly different from zero” (Hair, 2014), one runs the bootstrapping procedure. One consideration is that “the larger number of formative indicators used to measure a single construct, it becomes more likely that one or more indicators will have low or even nonsignificant outer weights” (Hair, 2014). “Nonsignificant indicator weights should not automatically be interpreted as indicative of poor measurement model quality. Rather, researchers should also consider a formative indicator’s absolute contribution to (or absolute

importance for) its construct; that is, the information an indicator provides without considering any other indicators" (Hair, 2014) by assessing outer loadings. "When an indicator's outer weight is nonsignificant, but its outer loading is high (i.e., above 0.50), the indicator should be interpreted as absolutely important but not as relatively important. In this situation, the indicator would generally be retained" (Hair, 2014). Otherwise, assess relative theoretical importance, but generally should be removed.

To analyze the outer weights for their significance and relevance as described above, I run the bootstrapping procedure. As recommended (Hair, 2014), the settings are (1) 5,000 bootstrap samples, (2) Do Parallel Processing, (3) No Sign Changes, (4) Complete Bootstrapping Results, (5) BCa Bootstrap Confidence Interval Method, (6) Two-Tailed Test Type, and (7) 0.05 Significance Level. Figure 17 shows the Bootstrap output. For the outer model, the numbers are Outer Weights and P-Values in the format of # (#), respectively. For the inner model, the numbers are the Path Coefficients and P-Values in the format of # (#), respectively.

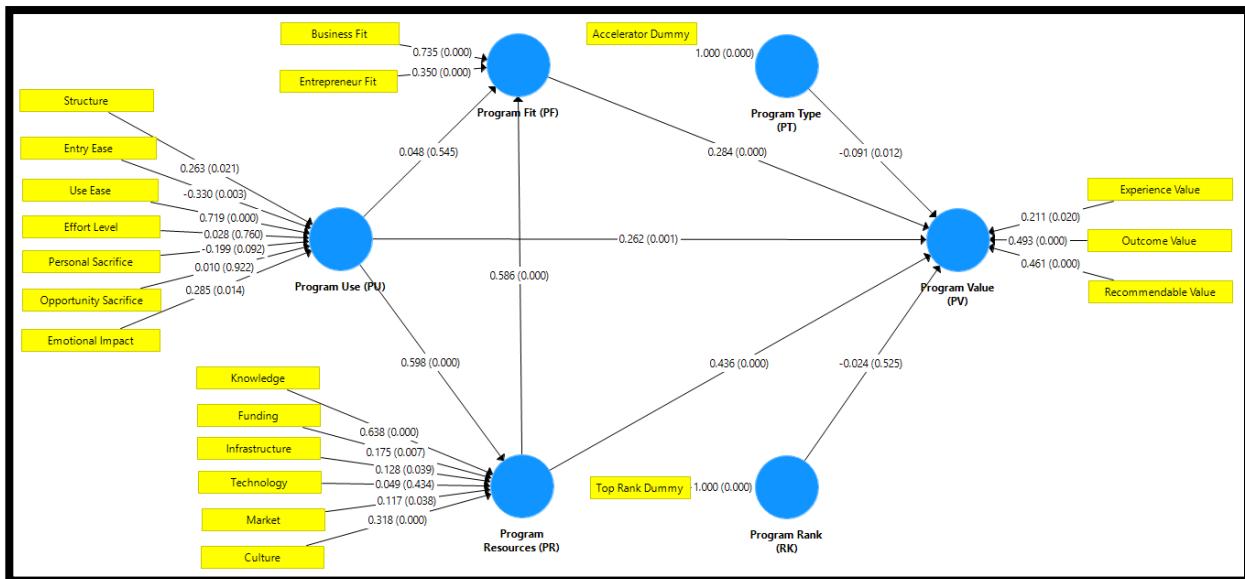


Figure 17 Model after Bootstrapping Procedure

Table 5 shows a summary of results. The table highlights four indicators as candidates for elimination as their outer weight p-values are insignificant (i.e., greater than 0.05), and their outer loadings are low (i.e., less than 0.50).

Table 5 Indicators Outer Weight Summary Output

	Outer Weights	T Statistics	P Values	Significance	Outer Loading	(for insignificant outer weights) High Outer Loading (> 0.5)
Business Fit -> Program Fit (PF)	0.74	8.88	0.00	Yes		
Culture -> Program Resources (PR)	0.32	5.29	0.00	Yes		
Effort Level -> Program Use (PU)	0.03	0.31	0.76	No	0.05	No
Emotional Impact -> Program Use (PU)	0.29	2.45	0.01	Yes		
Entrepreneur Fit -> Program Fit (PF)	0.35	3.57	0.00	Yes		
Entry Ease -> Program Use (PU)	-0.33	2.99	0.00	Yes		
Experience Value -> Program Value (PV)	0.21	2.33	0.02	Yes		
Funding -> Program Resources (PR)	0.18	2.68	0.01	Yes		
Infrastructure -> Program Resources (PR)	0.13	2.06	0.04	Yes		
Knowledge -> Program Resources (PR)	0.64	10.67	0.00	Yes		
Market -> Program Resources (PR)	0.12	2.08	0.04	Yes		
Opportunity Sacrifice -> Program Use (PU)	0.01	0.10	0.92	No	0.00	No
Outcome Value -> Program Value (PV)	0.49	7.20	0.00	Yes		
Personal Sacrifice -> Program Use (PU)	-0.20	1.69	0.09	No	-0.14	No
Recommendable Value -> Program Value (PV)	0.46	5.30	0.00	Yes		
Structure -> Program Use (PU)	0.26	2.30	0.02	Yes		
Technology -> Program Resources (PR)	0.05	0.78	0.43	No	0.42	No
Use Ease -> Program Use (PU)	0.72	4.99	0.00	Yes		

This output indicates that the indicators do not have relative nor absolute importance to their construct. Of course, as mentioned above, there is debate as to whether there is theoretical reasoning that allows for the removal of indicators, but on the other hand of the argument, if the indicator is insignificant in the model, it does not provide meaning in the construct. Since this is exploratory research instead of theory confirmation research, I elect to remove the variables so that I can better focus on the primary predictors. The removed indicators for the upcoming structural model evaluation are as follows: 1) Effort Level removed from the PROGRAM USE (PU) construct, 2) Opportunity Sacrifice removed from the PROGRAM USE (PU) construct, 3) Personal Sacrifice removed from the PROGRAM USE (PU) construct, and 4) Technology removed from the PROGRAM RESOURCES (PR) construct.

As a check, I rerun the bootstrapping procedure to verify that all remaining formative indicators remained significant. Table 6 display a summary of these outputs with the previously insignificant indicators removed as shown in Figure 18. In Figure 18, the outer model numbers are in an Outer Weights, and P-Values format of # (#), respectively and the inner model numbers are in a Path Coefficients and P-Values in the format of # (#), respectively. As a highlight in Table 6, I note that the largest weights on the independent variables:

- PROGRAM FIT (PF) is Business Fit (0.73)
- PROGRAM RESOURCES (PR) is Knowledge (0.64), and
- PROGRAM USE (PU) is Use Ease (.73).

For the dependent variable, PROGRAM VALUE (PV), there are two large weights:

- Outcome Value (0.50), and
- Recommendable Value (.46).

Table 6 Outer Weights Summary Without Insignificant Indicators

Indicators	Outer Weights	T Statistics	P Values	Significance
Business Fit -> Program Fit (PF)	0.73	8.81	0.00	Yes
Entrepreneur Fit -> Program Fit (PF)	0.35	3.59	0.00	Yes
Culture -> Program Resources (PR)	0.32	5.23	0.00	Yes
Funding -> Program Resources (PR)	0.18	2.77	0.01	Yes
Infrastructure -> Program Resources (PR)	0.16	2.71	0.01	Yes
Knowledge -> Program Resources (PR)	0.64	10.79	0.00	Yes
Market -> Program Resources (PR)	0.13	2.24	0.03	Yes
Emotional Impact -> Program Use (PU)	0.20	2.13	0.03	Yes
Entry Ease -> Program Use (PU)	-0.35	3.71	0.00	Yes
Structure -> Program Use (PU)	0.28	2.57	0.01	Yes
Use Ease -> Program Use (PU)	0.73	9.21	0.00	Yes
Experience Value -> Program Value (PV)	0.20	2.21	0.03	Yes
Outcome Value -> Program Value (PV)	0.50	7.44	0.00	Yes
Recommendable Value -> Program Value (PV)	0.46	5.50	0.00	Yes

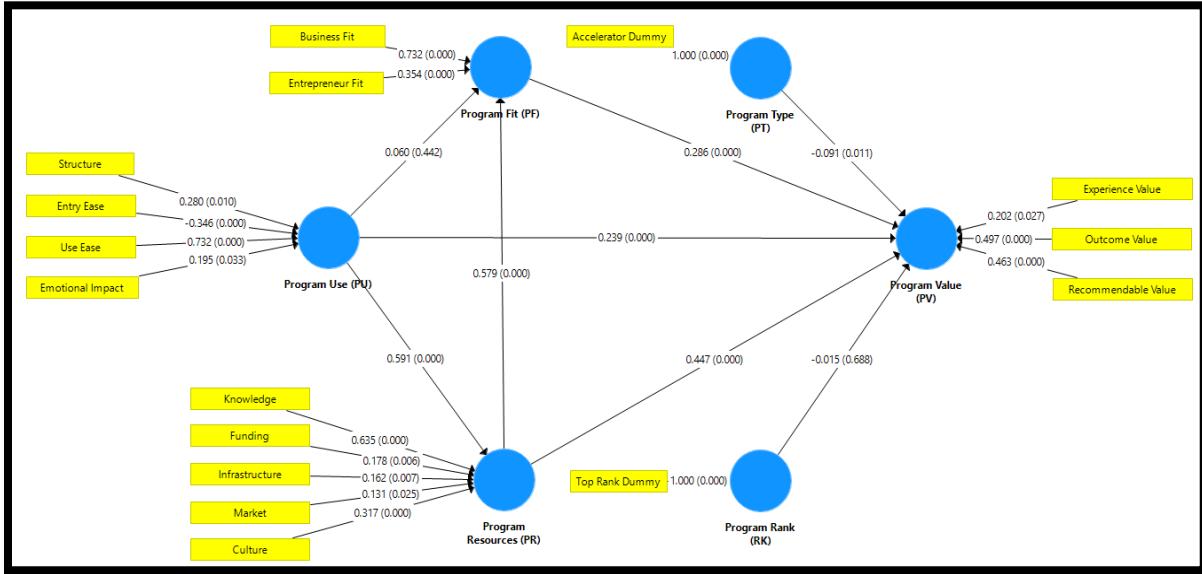


Figure 18 Model without insignificant indicators - Bootstrap Output

IV.2.2 Evaluation of Structural Model

Now that I have confirmed that the construct measures are reliable and valid, the next step is to assess the structural model. “This involves examining the model’s predictive capabilities and the relationships between the constructs” (Hair, 2014). I will use the following six steps to assess the structural model:

1. Assess structural model for collinearity issues
2. Assess the significance and relevance of the structural model relationships
3. Assess the level of R-Squared
4. Assess the f-squared effect size
5. Assess Mediation effects (indirect effects), and
6. Assess Moderation effects (Hair, 2014).

Note that I do not assess Q-squared and q-squared effect size because the structural model does not have any endogenous reflective constructs. Also, I do not evaluate the structural

model for goodness-of-fit, as it is generally meant for theory testing instead of theory exploration as well as there are conceptual concerns about current techniques that are in the early stages of development (Hair, 2014). The procedural reference for incorporating categorical variables as a predictor in a structural model is from Dr. James Gaskin (Categorical Predictors Via Dummy Variables Smartpls 3, 2017).

IV.2.2.1 Assess Structural Model for Collinearity Issues

The reason for examining for collinearity “is that the estimation of path coefficients in the structural models is based on OLS regressions of each endogenous latent variable on its corresponding predecessor constructs. Just as in a regular multiple regression, the path coefficients might be biased if the estimation involves critical levels of collinearity among the predictor constructs” (Hair, 2014). To assess collinearity, I apply the same measures as the evaluation of formative measurement models, namely evaluating the variance inflation factor (VIF). As a reminder, a VIF value of 5 and higher indicates a potential collinearity problem (Hair et al., 2011) (Hair, 2014). In this case, I am checking “whether there are critical levels of collinearity between each set of predictor variables” (Hair, 2014). If the level of collinearity is very high, as indicated by a VIF value of 5 or higher, “one should consider eliminating constructs or creating higher-order constructs” (Hair, 2014). To complete this assessment, I first run the PLS-Algorithm with the settings of (1) Path Weighting Scheme, (2) 300 Maximum Iterations and Stop Criterion of 1.0E-7 as recommended (Hair, 2014). Figure 19 shows the output.

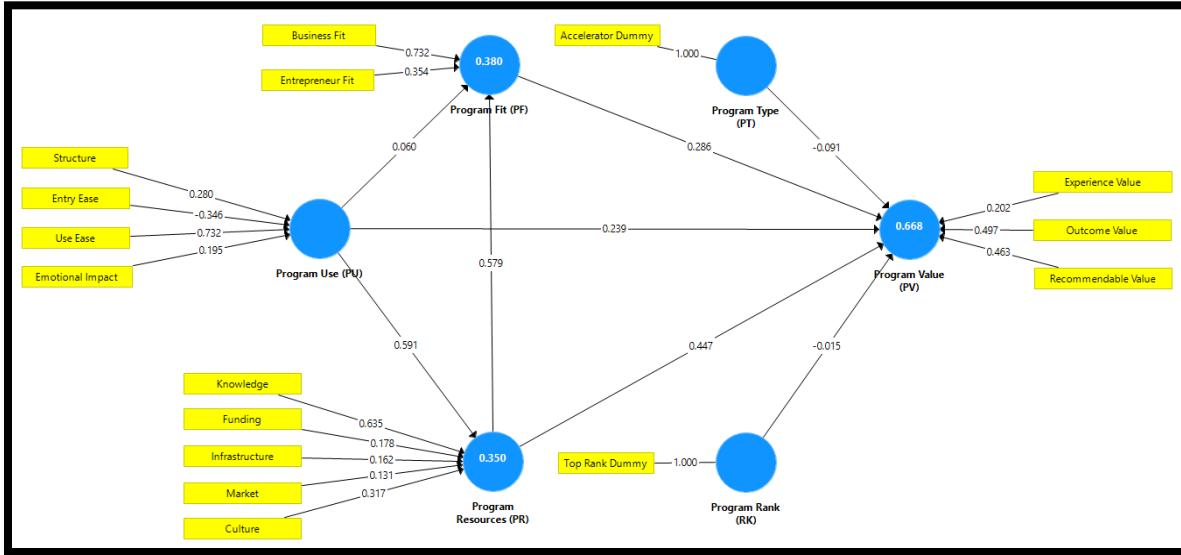


Figure 19 Inner Model Assessment - PLS Algorithm

As discussed, to assess collinearity issues, I examine the inner VIF values of all sets of predictor constructs in the structural model. Table 7 shows a reformatted Collinearity Statistics (VIF) output for the inner model. From the summary, collinearity among the predictor constructs is not a critical issue in the structural model as all values are clearly below the threshold of 5.

Table 7 Inner Model VIF Values Summary Output

	Inner VIF Values	Above 5.0 Threshold
Program Fit (PF) -> Program Value (PV)	1.69	No
Program Rank (RK) -> Program Value (PV)	1.23	No
Program Resources (PR) -> Program Fit (PF)	1.54	No
Program Resources (PR) -> Program Value (PV)	2.16	No
Program Type (PT) -> Program Value (PV)	1.24	No
Program Use (PU) -> Program Fit (PF)	1.54	No
Program Use (PU) -> Program Resources (PR)	1.00	No
Program Use (PU) -> Program Value (PV)	1.59	No

IV.2.2.2 Assess Significance & Relevance of Model Relationships

In the PLS-SEM algorithm, the structural model relationships estimates are the path coefficients, “which represent the hypothesized relationships among the constructs” (Hair, 2014). “The path coefficients have standardized values approximately between -1 and +1. Estimated path coefficients close to +1 represent strong positive relationships (and vice versa for negative values) that are usually statistically significant. The closer the estimated coefficients are to 0, the weaker are the relationships” (Hair, 2014) and more likely to not be significant. Beyond the significance of the relationships, examination of total effects aids in understanding relevance. Specifically, total effects help to evaluate how strongly each of the driver constructs ultimately influences the key target variable (Hair, 2014). Like the analysis completed for evaluating formative weights, I run the bootstrapping routine, with the same settings, to assess the path coefficients. Figure 20 shows path model from the bootstrapping output.

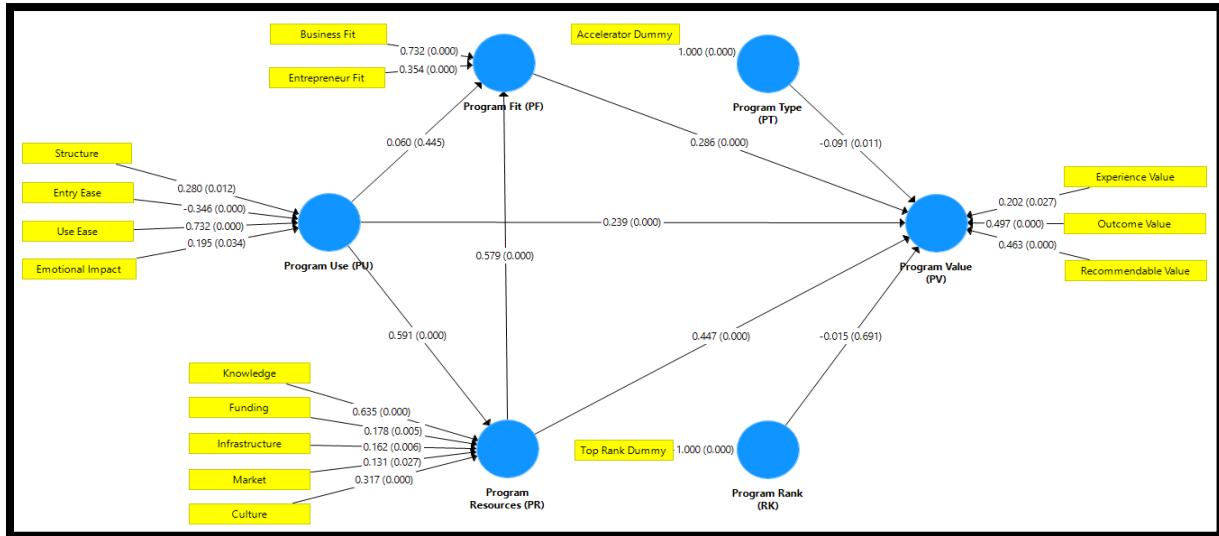


Figure 20 Inner Model Bootstrap Procedure Output

For this analysis, I focus on the inner model to understand the strength of the path coefficients. In Figure 20, in the inner model, the numbers are the path coefficients and p-values in the format of # (#), respectively. Table 8 summarizes this information along with adding an indication of significance. Two path coefficients are not significant, namely, the relationship between PROGRAM RANK (RK) and PROGRAM VALUE (PV) as well as the relationship between PROGRAM USE (PU) and PROGRAM FIT (PF). On the other hand, based on the path coefficient values and t statistics, I note that the strongest relationships:

- PROGRAM RESOURCES (PR) -> PROGRAM FIT (PF),
- PROGRAM RESOURCES (PR) -> PROGRAM VALUE (PV), and
- PROGRAM USE (PU) -> PROGRAM RESOURCES (PR).

Table 8 Structural Model Path Coefficient Assessment

	Path Coefficient	T Statistics	P Values	Significance
Program Fit (PF) -> Program Value (PV)	0.29	3.61	0.00	Yes
Program Rank (RK) -> Program Value (PV)	-0.02	0.40	0.69	No
Program Resources (PR) -> Program Fit (PF)	0.58	9.58	0.00	Yes
Program Resources (PR) -> Program Value (PV)	0.45	6.75	0.00	Yes
Program Type (PT) -> Program Value (PV)	-0.09	2.54	0.01	Yes
Program Use (PU) -> Program Fit (PF)	0.06	0.76	0.45	No
Program Use (PU) -> Program Resources (PR)	0.59	13.11	0.00	Yes
Program Use (PU) -> Program Value (PV)	0.24	3.84	0.00	Yes

To evaluate how strongly each of the constructs ultimately influences the target variable, I examine the total effects. Table 9 shows a summary of the total effects. All the independent variables, except PROGRAM RANK (RK), have a significant effect on PROGRAM VALUE (PV). PROGRAM RESOURCES (PR) and PROGRAM USE (PU) have the largest total effects on the PROGRAM VALUE (PV), with a strong effect size of approximate 0.6 for each.

Table 9 Total Effects Summary

	Total Effect	T Statistics	P Values	Significance
Program Fit (PF) -> Program Value (PV)	0.29	3.61	0.00	Yes
Program Rank (RK) -> Program Value (PV)	-0.02	0.40	0.69	No
Program Resources (PR) -> Program Value (PV)	0.61	12.71	0.00	Yes
Program Type (PT) -> Program Value (PV)	-0.09	2.54	0.01	Yes
Program Use (PU) -> Program Value (PV)	0.62	10.76	0.00	Yes

IV.2.2.3 Assess Coefficient of Determination

“The most commonly used measure to evaluate the structural model is the coefficient of determination, namely the R-Squared value. This coefficient is a measure of the model’s predictive power and is calculated as the squared correlation between a specific endogenous construct’s actual and predictive values. (Hair, 2014). “The coefficient represents the amount of variance in the endogenous constructs explained by all the exogenous constructs linked to it” (Hair, 2014). The R-squared value range from 0 to 1, with higher levels indicating higher levels of predictive accuracy. Rules of thumb for acceptance R-squared values “depends on the model complexity and the research discipline” (Hair, 2014). “In scholarly research that focuses on marketing issues, R-squared values of 0.75, 0.50 or 0.25 for endogenous latent variables can, as a rule of thumb, be respectively described as substantial, moderate, or weak (Hair et al., 2011; Henseler et al., 2009)” (Hair, 2014). Also, as with multiple regression, the adjusted R-squared should “be used as the criterion to avoid bias toward complex model” (Hair, 2014). From running the PLS Algorithm, I review the R square report under the Quality Criteria. Table 10 shows the report summary. From the output, I note that the dependent variable, PROGRAM VALUE (PV) for both R Square and R Square Adjusted are 0.66, which places it firmly in the moderate range (i.e., between 0.50 and 0.75). The other two constructs, PROGRAM FIT (PF)

and PROGRAM RESOURCES (PR) have R Square of 0.38 and 0.35 respective placing them in the weak range (i.e., between 0.25 and 0.50)

Table 10 R Square Summary

	R Square	R Square Adjusted	Predictive Power
Program Fit (PF)	0.38	0.38	weak
Program Resources (PR)	0.35	0.35	weak
Program Value (PV)	0.67	0.66	moderate

IV.2.2.4 Assess Effect Size

“In addition to evaluating the R-squared values of all endogenous constructs, the change in the R-squared value when a specified exogenous construct is omitted from the model can be used to evaluate whether the omitted construct has a substantive impact on the endogenous constructs. This measure is referred to the f-square effect size” (Hair, 2014). “Guidelines for assessing f-square are the values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects (Cohen, 1988) of the exogenous latent variable. Effect size values of less than 0.02 indicate that there is no effect” (Hair, 2014). From running the PLS Algorithm, I review the f-square report under the Quality Criteria. Table 11 shows the summary. Using the guidelines for f-square outlined above, I highlight that there are two predictor constructs that have a medium effect size (i.e., contribution) on the R-square value of the dependent variable, PROGRAM VALUE (PV), namely the constructs of PROGRAM RESOURCES (PR) and PROGRAM FIT (PF) with f-square effect sizes of 0.28 and 0.25, respectively. PROGRAM TYPE (PT) and PROGRAM USE (PU) has a small f-square effect size on PROGRAM VALUE (PV) with values of 0.02 and 0.11, respectively. The remaining variable, PROGRAM RANK (RK), has no effect. PROGRAM RESOURCES (PR) construct has a significant effect on PROGRAM VALUE (PV).

Table 11 F Square Effect Size Summary

	f-Square	Effect Size Rating	T Statistics	P Values	Significance
Program Fit (PF) -> Program Value (PV)	0.15	medium	1.73	0.08	No
Program Rank (RK) -> Program Value (PV)	0.00	no effect	0.10	0.92	No
Program Resources (PR) -> Program Fit (PF)	0.35	large	3.53	0.00	Yes
Program Resources (PR) -> Program Value (PV)	0.28	medium	3.19	0.00	Yes
Program Type (PT) -> Program Value (PV)	0.02	small	1.21	0.23	No
Program Use (PU) -> Program Fit (PF)	0.00	no effect	0.28	0.78	No
Program Use (PU) -> Program Resources (PR)	0.54	large	3.97	0.00	Yes
Program Use (PU) -> Program Value (PV)	0.11	small	1.70	0.09	No

IV.2.2.5 Assess Mediation Effects

“Mediation occurs when a third mediator variable intervenes between two other related constructs. More precisely, a change in the exogenous construct causes a change in the mediator variable, which in turn, results in a change in the endogenous construct in the PLS path model” (Hair, 2014). When assessing mediating effects, one evaluates direct and indirect effects.

“Direct effects are the relationships linking two constructs with a single arrow” (Hair, 2014) in the model. “Indirect effects are those relationships that involve a sequence of relationships with at least one intervening constructs involved. Thus, an indirect effect is a sequence of two or more direct effects and is represented visually by multiple arrows” (Hair, 2014) in the model.

To complete this analysis, I will conduct the three steps below:

- Step 5a: Assess specific indirect effects and total indirect effects
- Step 5b: Assess total effect via total indirect effects and direct effects
- Step 5c: Assess type of mediation effects

To conduct these steps of analysis, I begin by running the bootstrap routine as setup as above in Step 2. For Step 5a, I evaluate the Specific Indirect Effects output report as well as the Total Indirect Effects output report. Table 12 and Table 13 show these reports, respectively, modified to highlight key elements for analysis. From the reports, all indirect effects are

significant, except the specific indirect effect of PROGRAM USE (PU) \rightarrow PROGRAM FIT (PF) \rightarrow PROGRAM VALUE (PV).

Table 12 Specific Indirect Effects

	Specific Indirect Effect	T Statistics	P Values	Significance
Program Use (PU) \rightarrow Program Resources (PR) \rightarrow Program Fit (PF)	0.343	7.13	0.00	Yes
Program Use (PU) \rightarrow Program Resources (PR) \rightarrow Program Fit (PF) \rightarrow Program Value (PV)	0.098	3.13	0.00	Yes
Program Use (PU) \rightarrow Program Fit (PF) \rightarrow Program Value (PV)	0.017	0.72	0.47	No
Program Use (PU) \rightarrow Program Resources (PR) \rightarrow Program Value (PV)	0.264	5.78	0.00	Yes

Table 13 Total Indirect Effects

	Total Indirect Effect	T Statistics	P Values	Significance
Program Resources (PR) \rightarrow Program Value (PV)	0.166	3.17	0.00	Yes
Program Use (PU) \rightarrow Program Fit (PF)	0.343	7.13	0.00	Yes
Program Use (PU) \rightarrow Program Value (PV)	0.379	10.44	0.00	Yes

As a note, I highlight calculation differences between the specific indirect effects and total indirect effects outputs:

- The total indirect effect of PROGRAM RESOURCES (PR) \rightarrow PROGRAM VALUE (PV) is the calculated difference of the specific indirect effects of (PROGRAM USE (PU) \rightarrow PROGRAM RESOURCES (PR) \rightarrow PROGRAM VALUE (PV)) and (PROGRAM USE (PU) \rightarrow PROGRAM RESOURCES (PR) \rightarrow PROGRAM FIT (PF) \rightarrow PROGRAM VALUE (PV)).
- The total indirect effect of PROGRAM USE (PU) \rightarrow PROGRAM VALUE (PV) is the calculated sum of the specific indirect effects of (PROGRAM USE (PU) \rightarrow PROGRAM RESOURCES (PR) \rightarrow PROGRAM VALUE (PV)), and (PROGRAM USE (PU) \rightarrow PROGRAM FIT (PF) \rightarrow PROGRAM VALUE (PV)).

For Step 5b, I focus on the significance of total effects on PROGRAM VALUE (PV) in the context of the direct and total indirect effects. From the Table 14, total, direct and indirect

effects are significant, on PROGRAM VALUE (PV), except the effect of PROGRAM RANK (RK) -> PROGRAM VALUE (PV).

Table 14 Total Effects from Direct and Indirect Effects

	Total Effect	P Values	Significance	Direct Effect	P Values	Significance	Total Indirect Effect	P Values	Significance
Program Fit (PF) -> Program Value (PV)	0.29	0.00	Yes	0.29	0.00	Yes	-	-	-
Program Rank (RK) -> Program Value (PV)	-0.02	0.69	No	-0.02	0.69	No	-	-	-
Program Resources (PR) -> Program Value (PV)	0.61	0.00	Yes	0.45	0.00	Yes	0.17	0.00	Yes
Program Type (PT) -> Program Value (PV)	-0.09	0.01	Yes	-0.09	0.01	Yes	-	-	-
Program Use (PU) -> Program Value (PV)	0.62	0.00	Yes	0.24	0.00	Yes	0.38	0.00	Yes

And finally, for Step 5c, I evaluate the model for mediating effects. Using Table 14 from above, I summarize the following types of mediating effects:

- PROGRAM FIT (PF) -> PROGRAM VALUE (PV): Is a positive, direct-only effect with no mediation.
- PROGRAM RANK (RK) -> PROGRAM VALUE (PV): Is no effect.
- PROGRAM RESOURCES (PR) -> PROGRAM VALUE (PV): Is a positive, complementary, partial mediation effect.
- PROGRAM TYPE (PT) -> PROGRAM VALUE (PV): Is a negative, direct-only effect with no mediation.
- PROGRAM USE (PU) -> PROGRAM VALUE (PV): Is a positive, complementary, partial mediation effect.

As a note, a complementary mediation is when “the indirect effect and the direct effect are significant and point in the same direction.” Concluding this section, based on its insignificance and lack of effect, I remove PROGRAM RANK (RK) from the model for the remainder of the analysis. Now, I move on to the moderator analysis.

IV.2.2.6 Assess Moderation Effects

“Moderation describes a situation in which the relationship between two constructs is not constant but depends on the values of a third variable, referred to as a moderator variable. The moderator variable (or construct) changes the strength or even the direction of a relationship between two constructs in the model (Hair, 2014). When considering metric variables, “moderation can (and should) be seen as a means to account for heterogeneity in the data” (Hair, 2014). Another view of moderation is when considering categorical variables. In this case, the moderating variable “divides the data into two subsamples” (Hair, 2014). “The same model is then estimated for each of the distinct subsamples” (Hair, 2014). This analysis allows for “comparing the models and learning about significant differences between the subsamples” (Hair, 2014) through multigroup analysis. “Specifically, multigroup analysis enables the researcher to test for differences between identical modes estimated for different groups of respondents. The general objective is to see if there are statistically significant differences between individual group models” (Hair, 2014). Thus, I will break the evaluation into metric and categorical as the analysis techniques are different.

As a note, Hair (2014) recommends that “PLS-SEM analysis should be initially executed with the moderation.” “Then, the moderator analysis follows as a complementary analysis for specific moderating relationships” (Hair, 2014). This note is the reason I did not include the moderator in the earlier parts of the analysis.

As a reminder, in the structural model analysis, I consider only one moderating variable at a time as represented by ENTREPRENEUR’S CHARACTERISTICS (M). There are eight hypothesized moderators, M1 through M8, related to the entrepreneur’s experiences, demographics, and business. Below, I break them up into their metric and categorical groups as follows:

For metric analysis method,

- M1: Entrepreneur's Educational Experience
- M2: Entrepreneur's Age
- M3: Technical Level of Entrepreneur's Business
- M4: Entrepreneur's Business Experience

For categorical multigroup analysis (MGA) method,

- M5: Entrepreneur's Gender
- M6: Entrepreneur's Status as a Current or Past User of the BIA
- M7: Entrepreneur's Race
- M8: Entrepreneur's Previous Experience with BIAs

Note that all moderators are single item variables. Because of this singularity, there is not a need to conduct a measurement model analysis for reflective or formative constructs.

IV.2.2.6.1 Metric Moderators Analysis

I begin with the metric moderators. I place each moderator variable in the path model (separately). I create the interaction term that is proposed to moderate the dependent variable, PROGRAM VALUE (PV) and each of the independent variables (separately). I set up the interaction term using the recommended settings of standardized product term and two-stage approach due to the presence formative constructs in the model (Hair, 2014). I run the PLS algorithm and bootstrapping procedures. For moderation, I follow the recommended f-squared effect size thresholds by Kenny (2016), which are 0.005, 0.01, and 0.025 for small, medium and large effect sizes respectively (Hair, 2014). When interpreting the outputs "of a moderation analysis, the primary interest is with the significance of the interaction term. If the interaction term's effect on the endogenous construct is significant, we conclude that the moderator M has a

significant moderating effect on the relationship" (Hair, 2014). "In case of a significant moderation, the next step is to determine the strength of the moderating effect" (Hair, 2014). If the strength is significant, then the final step is examining slope plots to understand the nature of the relationship. Figure 21 shows an example of the moderator variable and the interaction term added to the path model; see the lower right-hand corner of the model. As a reminder, for parsimony, I removed the PROGRAM RANK (RK) construct based on its insignificance and lack of effect as shown in the previous analysis.

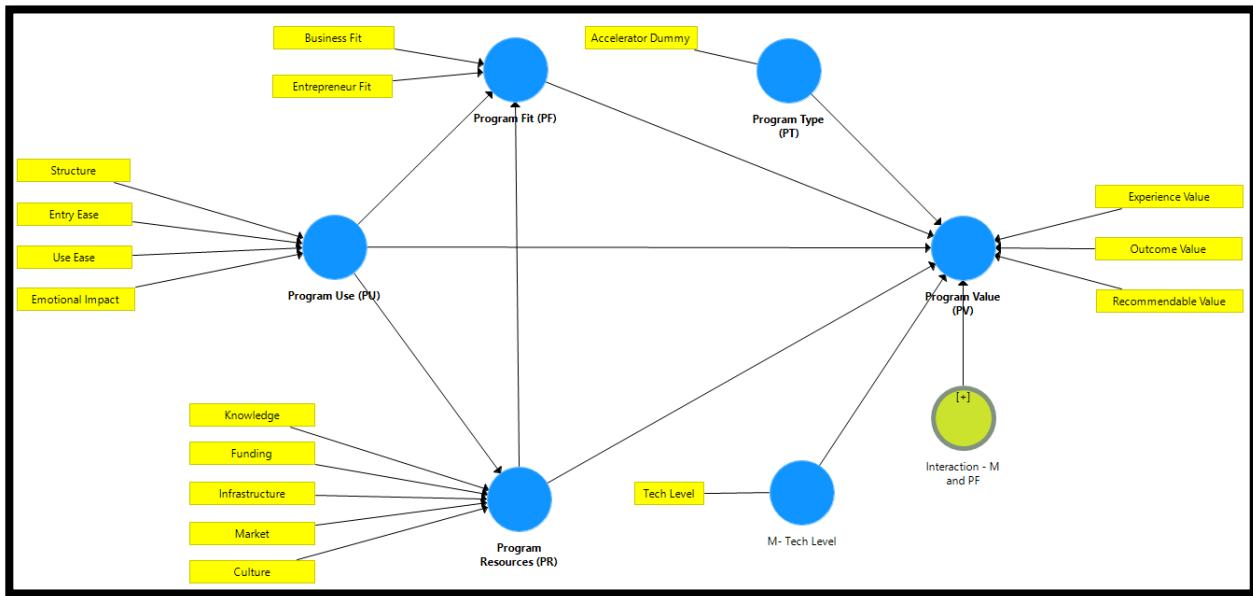


Figure 21 Moderating Effect in Model

I begin by evaluating the bootstrapping procedure output for the significance of the interaction term. Table 15 shows a summary of the significance of the interaction terms. From the output, there are two significant moderating effects. The first is the moderating effect of Entrepreneurs Education on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV). The second is the moderating effect of Entrepreneurs Business Experience on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV).

Table 15 Moderating Effects Summary

Moderator	Moderated Path	Interaction Coefficient	T Statistics	P Values	Significance
M1 - Education	Program Fit (PF) --> Program Value	-0.02	0.32	0.75	No
	Program Resources (PR) --> Program Value	0.05	0.81	0.42	No
	Program Use (PU) --> Program Value	-0.02	0.24	0.81	No
	Program Type (PT) --> Program Value	0.09	2.99	0.00	Yes
M2 - Age	Program Fit (PF) --> Program Value	0.02	0.45	0.66	No
	Program Resources (PR) --> Program Value	0.03	0.49	0.63	No
	Program Use (PU) --> Program Value	0.04	0.83	0.41	No
	Program Type (PT) --> Program Value	0.02	0.65	0.52	No
M3 - Tech Level	Program Fit (PF) --> Program Value	0.03	0.68	0.50	No
	Program Resources (PR) --> Program Value	-0.03	0.56	0.57	No
	Program Use (PU) --> Program Value	-0.01	0.25	0.81	No
	Program Type (PT) --> Program Value	0.05	1.49	0.14	No
M4 - Bus. Experience	Program Fit (PF) --> Program Value	0.01	0.18	0.86	No
	Program Resources (PR) --> Program Value	-0.02	0.31	0.76	No
	Program Use (PU) --> Program Value	-0.03	0.48	0.63	No
	Program Type (PT) --> Program Value	-0.07	1.93	0.05	Yes

Next, I investigate the effect size of the two significant moderating effects. I run the PLS-Algorithm and review the f-Square output. I evaluate the level of f-squared effect size using the thresholds by Kenny (2016), which are 0.005, 0.01, and 0.025 for small, medium and large effect sizes respectively (Hair, 2014). Table 16 shows a summary of this effect size output. The effect size is large for the moderating effect of Entrepreneurs Education on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV) given an effect size of 0.026. The effect size is medium for the moderating effect of Entrepreneurs Business Experience on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV) given an effect size of 0.014.

Table 16 F Square Effect Size for Moderating Terms

	f-Square (Program Value)	Moderation Effect Size
Interaction Term: M - Education and PT	0.026	Large
Interaction Term: M - Experience and PT	0.014	Medium

Lastly, I evaluate the simple slope plots for each of the moderating effects. Figure 22 shows the plot for moderating effect of Entrepreneurs Education on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV). The plot shows that strength of the relationship PROGRAM TYPE (PT) and PROGRAM VALUE (PV) decreases as education level increases.

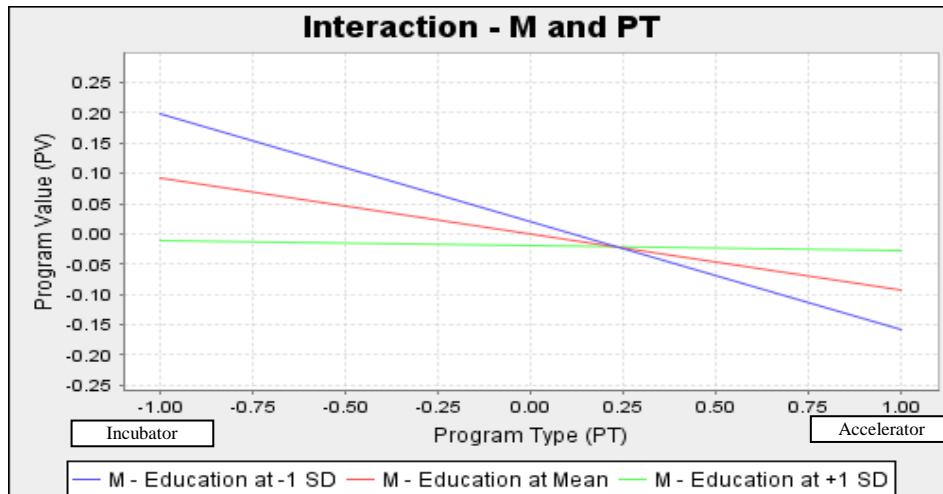


Figure 22 Simple Slope Plot: Moderator - Education and Program Type

Figure 23 shows the plot for the moderating effect of Entrepreneurs Business Experience on the relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV). The plot shows that strength of the relationship Program Type and PROGRAM VALUE (PV) decreases as business experience level increases.

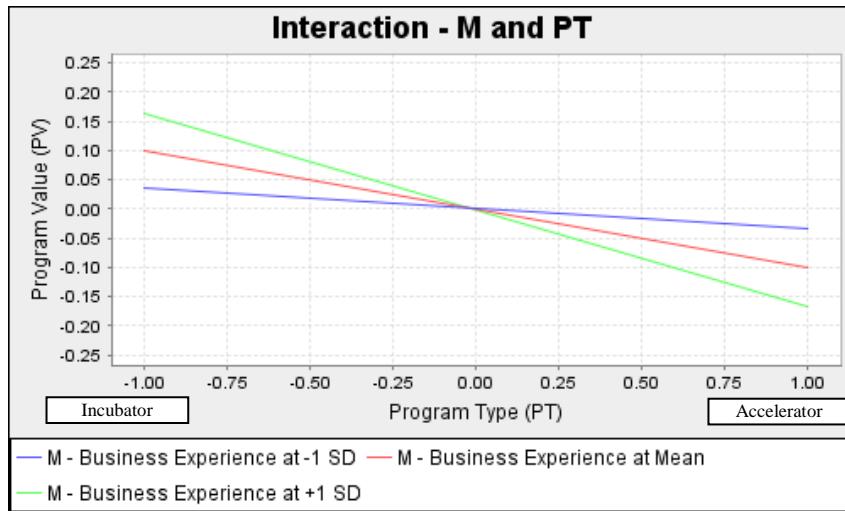


Figure 23 Simple Slope Plot: Moderator - Experience and Program Type

IV.2.2.7 Categorical Moderators Analysis

Next, I move to the analysis of the categorical moderators (M5 – M8). As previously mentioned, I will use multigroup analysis (MGA), which is a non-parametric approach to evaluating the categorical moderators. In this case, MGA is effectively a sub-group analysis. “Path coefficients based on different samples are almost always numerically different, but the question is whether the differences are statistically significant. Multigroup analysis helps to answer this question. Technically, a multigroup analysis tests the null hypothesis H₀ that the path coefficients are not significantly different” (Hair, 2014). “The corresponding alternative hypothesis H₁ is that the path coefficients are different” (Hair, 2014). “The primary concern in multigroup analyses is ensuring measurement invariance, also referred to as measurement equivalence. By establishing measurement invariance, researchers can be confident that group differences in model estimates do not result from the distinctive content and meaning of the latent variables across groups” (Hair, 2014). As a note, there is another popular non-parametric analysis approach instead of MGA. It is the Permutation approach. I do not use it based upon

the understanding that “its application requires the groups to be of similar size” (Hair, 2014), which is not the case for my data groups. Also, within MGA, “there are three methods of testing the significance of path difference” (Garson, 2016) within SmartPLS 3 (Ringle, 2015), namely PLS-MGA, Parametric Test and Welch-Satterthwait Test. For my analysis, I continue with my non-parametric approach and use the PLS-MGA test; the other two tests are parametric.

As noted above, I will begin my analysis by conducting a measurement invariance analysis, then follow it with an MGA as appropriate. To conduct the measurement invariance analysis, I run the MGA calculation, which is effectively close to the bootstrapping routine with the PLS weighting scheme set to factor and selection of the moderator variable groups; all other settings set the same as previous bootstrapping routines. After the calculation completes, I review the outer weights output for PLS-MGA. Any significant p-value is a measurement invariance concern. Note that this method of analysis of measurement invariance is from Dr. James Gaskin (Measurement Invariance Test for Mga in Smartpls, 2017). Table 17 shows a summary for the four moderators. Moderators M6 and M7 have no measurement invariance concerns. Moderators M5 and M8 each have one different indicator of concern that may potentially invalidate path coefficient MGA outputs for those constructs.

Table 17 Categorical Moderators - Measurement Invariance Summary

	M5: GENDER		M6: CURR/PAST USER		M7: RACE		M8: MULTI-USER		Measurement Invariance Concern
	Outer Weights Diff	P-Value	Outer Weights Diff	P-Value	Outer Weights Diff	P-Value	Outer Weights Diff	P-Value	
Accelerator Dummy <- Program Type (PT)	0.00	0.11	0.00	0.71	0.00	0.93	0.00	0.97	no
Business Fit -> Program Fit (PF)	0.13	0.20	0.03	0.41	0.00	0.50	0.20	0.13	no
Culture -> Program Resources (PR)	0.07	0.70	0.02	0.54	0.08	0.27	0.26	0.06	no
Emotional Impact -> Program Use (PU)	0.17	0.84	0.04	0.42	0.10	0.69	0.06	0.39	no
Entrepreneur Fit -> Program Fit (PF)	0.21	0.87	0.04	0.56	0.01	0.48	0.26	0.90	no
Entry Ease -> Program Use (PU)	0.24	0.11	0.08	0.63	0.16	0.80	0.14	0.67	no
Experience Value -> Program Value (PV)	0.08	0.32	0.20	0.15	0.10	0.33	0.31	0.03	no
Funding -> Program Resources (PR)	0.26	0.96	0.04	0.62	0.07	0.68	0.34	0.99	no
Infrastructure -> Program Resources (PR)	0.11	0.21	0.03	0.59	0.09	0.74	0.07	0.32	no
Knowledge -> Program Resources (PR)	0.24	0.04	0.05	0.35	0.05	0.63	0.01	0.48	Yes - M5
Market -> Program Resources (PR)	0.09	0.74	0.16	0.16	0.10	0.23	0.10	0.76	no
Outcome Value -> Program Value (PV)	0.08	0.31	0.18	0.80	0.05	0.60	0.15	0.81	no
Recommendable Value -> Program Value (PV)	0.14	0.78	0.17	0.22	0.03	0.43	0.09	0.70	no
Structure -> Program Use (PU)	0.14	0.76	0.12	0.31	0.10	0.33	0.68	0.96	no
Use Ease -> Program Use (PU)	0.24	0.05	0.14	0.71	0.22	0.86	0.48	0.01	Yes - M8

Next, I rerun the MGA calculation, this time selecting the PLS weighting scheme set to path. After the calculation completes, I review the path coefficients output for PLS-MGA. Any significant p-value is indicating a difference within sub-groups. Note that this method of analysis of measurement invariance is from Dr. James Gaskin (Smartpls 3 Multigroup Analysis Mga, 2017). Table 18 shows a summary for the four moderators. Note that although all the moderators are shown together in this table, they were measured individual; not including interactions amongst them. Moderators M6 and M7 have no significant path coefficients. Moderators M5 and M8 indicate potentially significant path coefficient differences, but I cannot be certain whether this is due to measurement or trait differences due to the 'Use Ease' indicator measurement invariance concern in the PROGRAM USE (PF) construct.

Table 18 Multigroup Analysis for Categorical Moderators

	M5: GENDER		M6: CURR/PAST USER		M7: RACE		M8: MULTI-USER		Significant Sub-Group Difference
	Path Coefficients Diff	P-Value							
Program Fit (PF) -> Program Value (PV)	0.11	0.25	0.06	0.60	0.01	0.50	0.23	0.95	no
Program Resources (PR) -> Program Fit (PF)	0.32	1.00	0.13	0.22	0.08	0.70	0.07	0.30	no
Program Resources (PR) -> Program Value (PV)	0.10	0.76	0.05	0.43	0.01	0.49	0.01	0.52	no
Program Type (PT) -> Program Value (PV)	0.06	0.78	0.06	0.27	0.15	0.96	0.16	0.97	no
Program Use (PU) -> Program Fit (PF)	0.56	0.00	0.08	0.65	0.20	0.14	0.05	0.37	Yes - M5
Program Use (PU) -> Program Resources (PR)	0.07	0.76	0.12	0.11	0.10	0.13	0.01	0.65	no
Program Use (PU) -> Program Value (PV)	0.04	0.61	0.08	0.67	0.05	0.61	0.35	0.00	Yes - M8

IV.3 Primary Results – Hypotheses Summary

Given the analysis, I revisit each of the model hypotheses and state whether to reject or not reject the null hypotheses for the alternative hypotheses for a statistical significance level of 0.05. The null hypothesis (H_0) is a statement of no difference or no relationship, while the alternate hypothesis (H_A) is a statement of difference or relationship not due to chance. Table 19 displays a summary of the results.

Table 19 Hypotheses Results Summary

Hypothesis	Description	Result	
H1	Positive relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant positive relationship with a medium effect size
H2	Positive relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant positive relationship with a small effect size
H3	Positive relationship between PROGRAM FIT (PF) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant positive relationship with a medium effect size
H4	PROGRAM FIT (PF) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV)	Reject H_A	No significant mediation detected
H5	PROGRAM RESOURCES (PR) will positively mediate a relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant, positive, partial mediation relationship
H6	PROGRAM FIT (PF) will positively mediate the relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant, positive, partial mediation relationship
H7	Relationship between PROGRAM TYPE (PT) and PROGRAM VALUE (PV)	Reject H_0 ; Accept H_A	Significant positive relationship with a small effect size
H8	Positive relationship between PROGRAM RANK (RK) and PROGRAM VALUE (PV)	Reject H_A	No significant relationship detected
H9	Relationship between (each) ENTREPRENEUR'S CHARACTERISTICS (M1 – M8) and PROGRAM VALUE (PV)	Reject H_A with exception	No significant moderation detected, Except for: M1: Significant moderating effect on PROGRAM TYPE (PT) and PROGRAM VALUE (PV) M4: Significant moderating effect on PROGRAM TYPE (PT) and PROGRAM VALUE (PV)

In conjunction with Table 19, I provide the following summary:

- H1: The analysis supports that there is a significant positive relationship with medium effect size between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV).
- H2: The analysis supports that there is a significant positive relationship with small effect size between PROGRAM USE (PF) and PROGRAM VALUE (PV).
- H3: The analysis supports that there is a significant positive relationship with medium effect size between PROGRAM FIT (PF) and PROGRAM VALUE (PV).
- H4: The analysis does not support that there is a significant mediation relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV) on PROGRAM FIT (PF).
- H5: The analysis does support that there is a significant, positive, partial mediation relationship between PROGRAM USE (PU) and PROGRAM VALUE (PV) on PROGRAM RESOURCES (PR).
- H6: The analysis does support that there is a significant, positive, partial mediation relationship between PROGRAM RESOURCES (PR) and PROGRAM VALUE (PV) on PROGRAM FIT (PF).
- H7: The analysis supports that there is a significant positive relationship with small effect size between PROGRAM TYPE (PF) and PROGRAM VALUE (PV).
- H8: The analysis does not support that there is a significant positive relationship between PROGRAM RANK (RK) and PROGRAM VALUE (PV).
- H9: Regarding the relationship between (each) ENTREPRENEUR'S CHARACTERISTICS (M) and PROGRAM VALUE (PV):

- M1: Educational Experience - Do not reject the null hypothesis of no difference for all relationships, except for the significant moderating effect on PROGRAM TYPE and PROGRAM VALUE.
- M2: Age - Do not reject the null hypothesis of no difference
- M3: Technical Level of Business - Do not reject the null hypothesis of no difference
- M4: Business Experience - Do not reject the null hypothesis of no difference for all relationships, except for the significant moderating effect on PROGRAM TYPE and PROGRAM VALUE.
- M5: Gender - Do not reject the null hypothesis of no difference
- M6: BIA User Status - Do not reject the null hypothesis of no difference
- M7: Race - Do not reject the null hypothesis of no difference
- M8: Previous Experience with BIAs - Do not reject the null hypothesis of no difference

IV.4 Secondary Analysis & Results - Deeper Insights On Value

As mentioned earlier, beyond the primary analysis of the variance model, I dig deeper into understanding PROGRAM VALUE (PV) through supplemental survey questions asked to the entrepreneurs.

IV.4.1 *Outcome Value Insights*

The dependent variable in the initial quantitative analysis is PROGRAM VALUE (PV). The construct comprises three indicator variables. In this section, I explore one of the three indicators, namely Outcome Value; which had the largest outer weight (i.e., indicator coefficient) in the model for PROGRAM VALUE (PV). The question I asked the entrepreneurs was as

follows: **How valuable has the incubator or accelerator been toward improving outcomes for your business, thus far?**

I explore this question by graphing the distribution of answers; Figure 24 shows the output. The graph shows that most of the entrepreneurs feel that the BIA provides value with ~60% indicating it was ‘very valuable’ or ‘extremely valuable.’ The median of the data is 4.0 and mean of 3.7 on a 5-point scale. An independent samples t-test does not indicate any significant difference between the answers of incubator and accelerator users.; see Table 20.

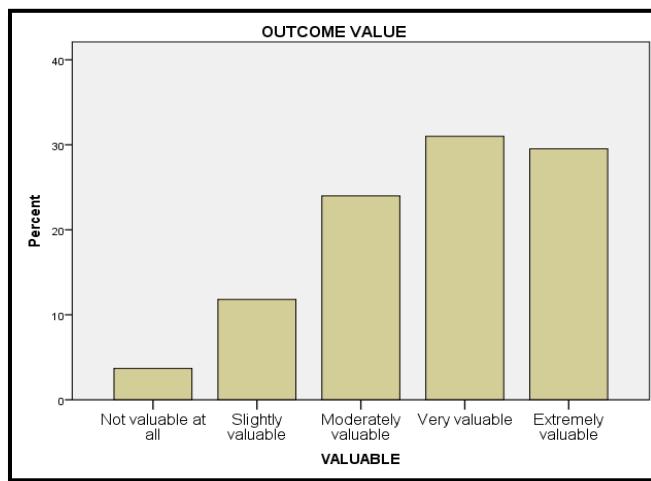


Figure 24 Outcome Value Distribution

Table 20 Outcome Value – Incubator vs. Accelerator Users

Group Statistics		Independent Samples Test*						
Differences by BIA_TYPE								
OUTCOME_VALUE	BIA_TYPE	Mean	Std. Deviation	t	Sig. (2-tailed)	Interval of the		
		Incubator	3.70	1.109	-0.258	0.797	-0.351	0.270
		accelerator	3.74	1.113				

*Results for equal variances assumed per Levene's Test for Equality of Variances; no difference in significance.

To dig further into outcome value, in the questionnaire, I ask the respondents “**More specifically, what types of outcome impact, thus far, have you experienced?**”. I provide the participants seven impact areas on a five-point ordinal scale. The seven impact areas are as follows:

1. Speed to Market
2. Profits / Margins
3. Growth / Expansion
4. Market Identification
5. Capital Funding
6. Reduced Expenses, and
7. Better Product / Services.

To analyze their responses, I create a path model in SmartPLS 3 (Ringle, 2015) to garner the T Statistic. I run the PLS algorithm and the Bootstrap procedure mirroring the setup used to analyze the primary path model in earlier sections. As each impact area is a single item, measurement model analysis is not applicable; thus, the focus is on the structural model to understand the statistical significance of the path coefficients for the independent variable to dependent variable relationships. Table 21 shows a summary output for each path displaying the path coefficient, T Statistics, P Values, significance flag and f Square (effect size). Four of the seven independent variables are significant, namely, Growth / Expansion, Market Identification, Capital Funding and Better Product / Services. Figure 25 graphically highlights the path coefficients. The relationship with the dependent variable is positive, indicating that as entrepreneurs have a more positive perception about these each of these four variables, the more positive they perceive Program Value (PU). I note that the effect sizes are small; likely not usual

for this type of simple model. For the model, R-square is 0.513 and R-squared adjusted is 0.500.

Table 21 Outcome Value Analysis Summary

	Path Coefficients	T Statistics	P Values	Significance	f Square
Better Products or Services -> Outcome Value	0.11	1.95	0.05	Yes	0.02
Capital Funding -> Outcome Value	0.18	3.62	0.00	Yes	0.05
Growth or Expansion -> Outcome Value	0.29	4.34	0.00	Yes	0.08
Market Identification -> Outcome Value	0.23	3.87	0.00	Yes	0.07
Profits or Margins -> Outcome Value	0.04	0.63	0.53	No	0.00
Reduced Expenses -> Outcome Value	0.06	1.30	0.20	No	0.01
Speed to Market -> Outcome Value	0.09	1.46	0.14	No	0.01

Lastly, I investigate whether there are differences between incubator versus accelerator users regarding specific outcome value. An independent samples t-test does indicate that there are significant differences at the 0.05 confidence level for three of the measures, namely Capital Funding, Reduced Expenses, and Better Products or Services. Table 22 summarized the results. I will discuss the implications of these finding in the discussion section

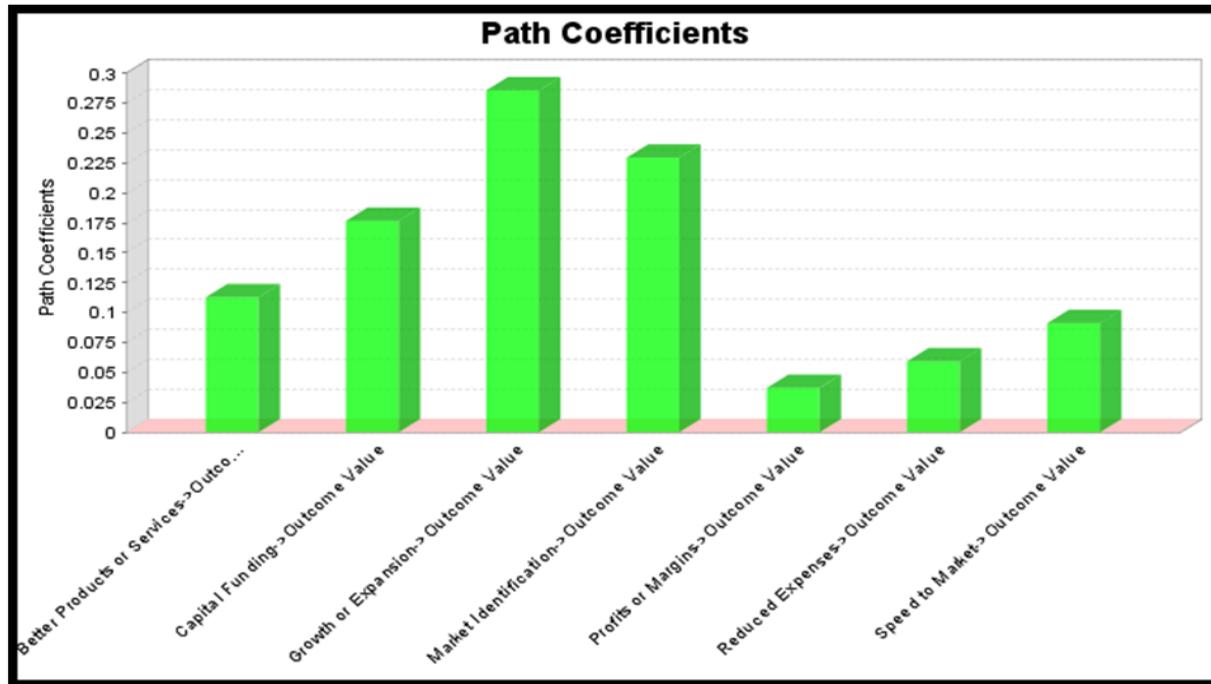


Figure 25 Outcome Value Model - Path Coefficients Chart

Table 22 Specific Outcome Value – Incubator vs. Accelerator Users

Group Statistics			Independent Samples Test*			
			Interval of the			
			t	Sig. (2-tailed)	Lower	Upper
IMPACT_SPEED	Incubator	3.27	1.125	-0.791	0.430	-0.462 0.197
	accelerator	3.40	1.162			
IMPACT_PROFIT	Incubator	2.82	1.142	-0.057	0.955	-0.312 0.294
	accelerator	2.83	1.003			
IMPACT_GROWTH	Incubator	3.30	1.122	-1.087	0.278	-0.478 0.138
	accelerator	3.47	1.076			
IMPACT_MKT	Incubator	3.41	1.189	-1.252	0.212	-0.507 0.113
	accelerator	3.61	1.079			
IMPACT_FUND	Incubator	2.62	0.986	-5.812	0.000	-1.275 -0.630
	accelerator	3.58	1.153			
IMPACT_EXPENSE	Incubator	3.74	1.326	4.442	0.000	0.440 1.141
	accelerator	2.95	1.211			
IMPACT_PROD_SERV	Incubator	3.26	1.176	-2.096	0.037	-0.641 -0.020
	accelerator	3.59	1.075			

*Results for equal variances assumed per Levene's Test for Equality of Variances; no difference in significance.

IV.4.2 Recommendable Value Insights

In addition to Outcome Value, the dependent variable, PROGRAM VALUE (PV), has another indicator variable with a strong outer weight, namely, Recommendable Value. The question I asked the entrepreneurs was as follows: **Based on business value, how likely would you be to recommend the incubator or accelerator to most entrepreneurs?**

Like the previous indicator variable, I explore this question by graphing the distribution of answers; Figure 26 shows the output. The graph shows that most of the entrepreneurs would recommend BIAs based on business value with 78% indicating ‘somewhat likely’ or ‘definitely would’ to recommend. The median of the data is 7.0.

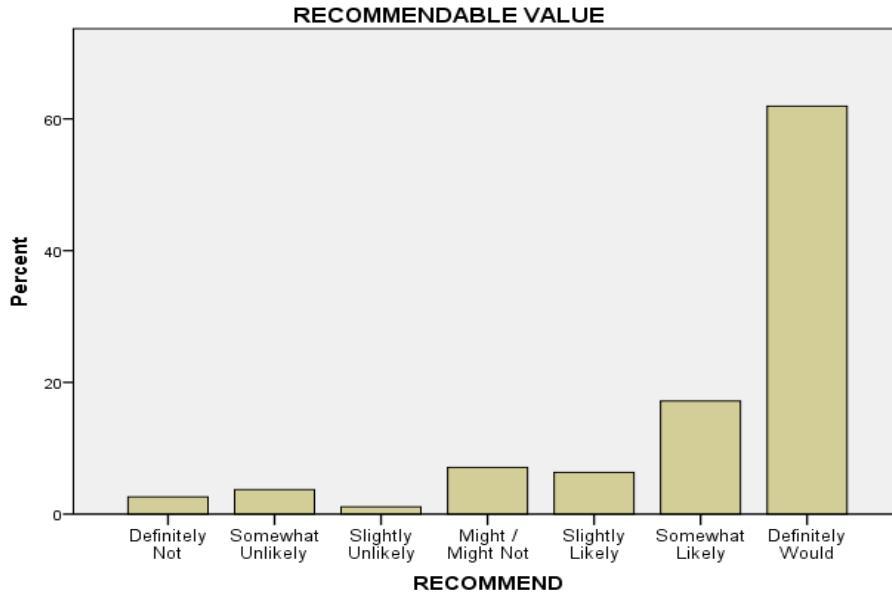


Figure 26 Recommendable Value Distribution

To dig further into Recommendable Value, in the questionnaire, I ask the respondents “**Based on business value, how likely would you be to recommend the incubator or accelerator to most entrepreneurs?**” I provide the participants three stages on the same seven-point ordinal scale. The three stages are as follows:

1. In early-stage, before market entrance
2. In mid-stage, when in market for a short time, and
3. In later-stage, after being in market for some time.

To analyze their responses, I create a path model in SmartPLS 3 (Ringle, 2015) to garner the T Statistic. I run the PLS algorithm and the Bootstrap procedure mirroring the setup used to analyze the primary path model in earlier sections. As each impact area is a single item, the measurement model analysis is not applicable; thus, the focus is on the structural model to understand the statistical significance of the path coefficients for the independent variable to

dependent variable relationships. Table 23 shows a summary output for each path displaying the path coefficient, T Statistics, P Values, significance flag and f Square (effect size). Figure 27 graphically highlights the path coefficients. Two of the three independent variables have p-values below the 0.05 confidence level, namely, Recommend to Early Stage and Recommend to Mid Stage. Figure 27 graphically highlights the path coefficients. The relationship IS positive. I note that the effect size (f Square) for Recommend to Mid Stage is large and effect size for Recommend to Early Stage is medium. For the model, the R-square is 0.568, and the R-squared Adjusted is 0.564.

Table 23 Recommendable Value Analysis Summary

	Path Coefficients	T Statistics	P Values	Significance	f Square
Recommend to Early Stage Startup -> Recomm. Value	0.30	5.57	0.00	Yes	0.17
Recommend to Mid Stage Startup -> Recomm. Value	0.55	8.28	0.00	Yes	0.35
Recommend to Late Stage Startup -> Recomm. Value	0.07	1.37	0.17	No	0.01

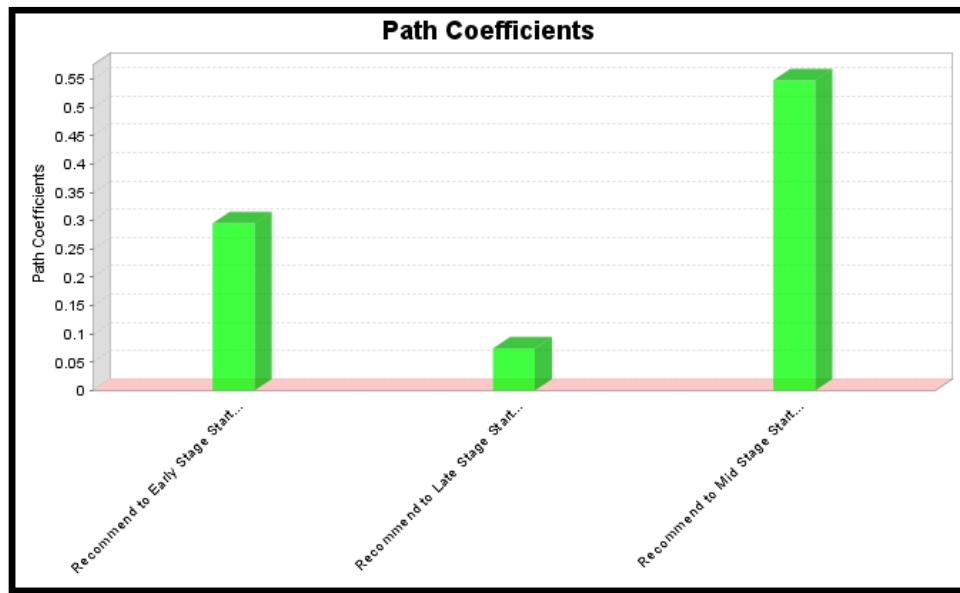


Figure 27 Recommendable Value Path Coefficients Chart

Lastly, I investigate whether there are differences between incubator versus accelerator users regarding recommendable value. An independent samples t-test does not indicate any significant difference at 0.05 confidence level between the answers of incubator and accelerator users. I note that the means for early-stage and mid-stage are higher with lower standard deviations than late-stage; relative to a 7-point scale. Table 24 summarizes these results.

Table 24 Recommendable Value – Incubator vs. Accelerator Users

Group Statistics			Independent Samples Test*			
Differences by BIA_TYPE			Interval of the			
			t	Sig. (2-tailed)	Lower	Upper
RECOMMENDABLE_OVERALL	Incubator	6.27	1.376	0.953	0.342	-0.216
	accelerator	6.07	1.533			0.621
RECOMMENDABLE_early stage	Incubator	6.02	1.678	1.626	0.105	-0.089
	accelerator	5.59	1.882			0.935
RECOMMENDABLE_mid stage	Incubator	5.53	1.666	-0.205	0.838	-0.519
	accelerator	5.58	1.692			0.422
RECOMMENDABLE_late stage	Incubator	4.29	2.074	-0.234	0.815	-0.644
	accelerator	4.36	2.059			0.507

*Results for equal variances assumed per Levene's Test for Equality of Variances; no difference in significance.

IV.4.3 Other Differences – Insights

IV.4.3.1 Incubator Vs. Accelerator Users

Like Table 24 above, I conducted independent samples t-tests for other variables in the variance model. To tease out additional incubator versus accelerator differences, here is a list of the relevant variables (or indicators) that had t-test mean differences at the 0.05 confidence level.

- Easy of Entry in Incubator or Accelerator (under Program Use construct)
- BIA Structure (under Program Use construct)
- Knowledge Resources (under Program Resources construct)
- Funding Resources (under Program Resources construct)

- Infrastructure Resources (under Program Resources construct)
- Market Resources (under Program Resources construct)

IV.4.3.2 Multi-Users Vs. First-Time Users

Regarding the Business Fit variable from the Program Fit construct, I sought to understand that if a user had participated in more than one program (i.e., not a first-time user) did they perceive their business fit to be better; meaning did previous experience potentially lead to better choice. The t-test did indicate difference at the 0.05 significance level between multi-program users and first-time program users.

IV.4.3.3 Positive Vs. Negative Business Status

As mentioned in the literature review the five-year survival rate of U.S. new companies in 2014 was 48.7% (Fairlie, Morelix, Tareque, et al., 2016), but in contrast, several “studies have found considerable evidence linking incubation to greater firm survival. (Stokan et al., 2015)” In my research, the previous BIA users are requested to indicate the status of their business from a list of choices. I rate the responses as positive (e.g., ‘still own and doing well’, ‘had IPO’) or negative (e.g., ‘still own and not doing well’, ‘business closed’); 78% of respondents have a positive business status rate, seemly aligning to greater firm survival. Next, I evaluated whether business survival rate effects value measures; thus, I performed an independent samples t-tests. The tests revealed that there are statistically significant mean differences for Outcome Value as well as Recommendable Value, but not for Experience Value. For Outcome Value, users with a negative business status tended toward ‘moderate value’ in contrast to ‘very valuable’ for users with a positive business status. For recommendable value, users with a negative business status tended toward ‘slightly to somewhat likely to recommend’ in contrast to ‘somewhat likely to definitely to recommend’ for users with a positive business status.

IV.4.4 Most Valuable Resources - Insights

In the questionnaire, I ask the following open-ended question: **What incubator or accelerator resources (or help) have been most valuable to you?**

To perform a qualitative analysis of respondent answers to this question, I upload the survey into NVivo 11 and perform a Word Frequency Query investigation. The query setup is a grouping of ‘with stemmed words,’ a minimum word length of four, display words of 25 most frequent and I filter for stop words. Figure 28 shows the Word Cloud output for the question.

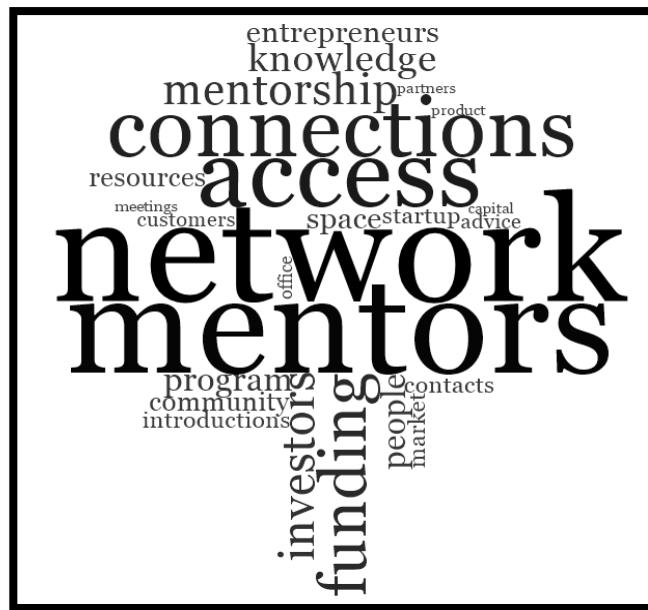


Figure 28 Word Cloud - Most Valuable

From evaluating the Word Cloud, reviewing the word count summary output and reading the responses, the top three most frequent word groupings as indicators of most valued resources or help are as follows:

1. Network / Connections / Contacts / Introductions (Count = 113)
2. Mentors / Mentorship / Advice (Count = 83)
3. Funding / Investors / Capital (Count = 55)

Below are a few representative respondent responses to garner additional context about the top word groupings:

“The mentors, their knowledge, and resources have been the most valuable. It's one thing to be able to read a book, but it's more important for me to be able to ask questions and get an answer.”

“Access to human capital. The type of people in the retail industry I have met has helped my business gain the exposure it otherwise would not have gotten.”

“The \$50,000. It is often said that if you join an accelerator for the money you are joining for the wrong reasons. However, if all you gained from the accelerator is \$50,000, then you are still \$50,000 up and were \$50,000 closer to reaching your goal than before you applied. This was my experience.”

“Entering the startup, I was essentially a one-man team with no prior experience in a tech startup. I left the program with a 4-man team. I received great insight and wisdom from knowledgeable, experienced mentors and was given a complete indoctrination to all aspects of startup culture. My company would have had zero chance at success without going through the program.”

“Preparing financial reports to seek investor funding, writing investor reports to communicate with investors, presentations on finances, including a detailed discussion of costs, preparing pitch deck and practicing pitch.”

“The community of the accelerator is fantastic. Being a founder is very isolating, and being around motivated, like-minded individuals was great to increase productivity and morale.”

IV.4.5 Resources Not Received Or Inadequate – Insights

Lastly, in the questionnaire, I ask the following open-ended question: **What desired help was not or has not been received or was inadequate from the incubator or accelerator?**

To perform a qualitative analysis of respondent answers to this question, I use the uploaded survey in NVivo 11 and perform a Word Frequency Query investigation. The query setup is same as for the previous question. Figure 29 shows the Word Cloud output for the question.



Figure 29 Word Cloud - Unrealized Help

From evaluating the Word Cloud, reviewing the word count summary output and reading the responses, the top three most frequent word groupings as indicators of most desired unrealized help or inadequacies are as follows:

1. Funds / Investors / Capital / Financial / Investment (Count = 81)
2. Program / Follow (up) / Expectations / Structured (Count = 47)
3. Marketing / Customers / Sales (Count = 43)

Below are a few representative respondent responses to garner additional context about the top word groupings:

“In the follow-up since finishing the program the engagement from the program has been scattered, unorganized, and not helpful.”

“Would definitely like to see more focus on customer introductions and less on investors, but that's not likely to be the case for most start-ups. We were just in a place where we're growing fast and don't need funding as much as we want rapid customer growth.”

“The programs are geared towards people who are very young or little to no business experience, and activities are forced on you irrespective of how irrelevant they are to you and your business. The content is generic, and the time is better spent on customers who want your product and service.”

“We wish that the accelerator would have had buyers and early adopters vetted and signed up to work/purchase products from members of the accelerators. The biggest hurdle for all startups is to find a willing (and paying) first customer. Our accelerator did not do a good job in identifying businesses in their network that would be amenable to working with a startup.”

"They were helpful with learning how to raise investment and pitch your ideas. But not helpful at all with actual business aspects, such as web design, product photography, branding, marketing, manufacturing, logistics, etc. I was expecting more help in those areas and found the program to be kind of a waste if not seeking additional rounds of funding."

"Wish we would have been able to raise more money from the investor network."

V DISCUSSION

V.1 Key Findings & Implications

Returning to the original research questions, I detail the key findings and discuss the implication based on the study results. As a reminder, in conducting this research, I aim to answer the following research questions:

To what extent do entrepreneurs value business incubators and accelerators?

And what contributes to this value?

V.1.1 *Research Question 1: Presence Of Value*

FINDING #1: All three measures of value are significant; Outcome Value most influential.

I begin with the first of the two questions. The key finding is a resounding yes that a significant number of the entrepreneurs, that have used or are currently using incubators or accelerators, find these programs very valuable toward improving their business outcomes. Moreover, these entrepreneurs find the programs so valuable that they strongly recommend their usage to fellow entrepreneurs, especially in the early to mid-stages of developing businesses. This appreciation for the worth of the programs is so strong that these entrepreneurs felt the program experience to be very valuable regardless of whether their businesses ultimately survived. Additive to these finding is that previous users differ depending on the status of their business. For Outcome Value, users with a negative business status tended toward ‘moderate value’ in contrast to ‘very valuable’ for users with a positive business status. For recommendable value, users with a negative business status tended toward ‘slightly to somewhat likely’ to recommend in contrast to ‘somewhat likely to definitely’ to recommend for users with a positive business status. There was no difference regarding the value of the experience.

IMPLICATIONS: The implications of these collective findings are tremendous. As discussed in the literature review, there is an on-going debate as to whether business incubators and accelerators are worthwhile investments in improving business outcomes for entrepreneurial endeavors; are they making an impact? The entrepreneurs, who are the first-hand users, strongly indicate that the incubators and accelerators are having a very-to-extremely positive impact (i.e., value) on progressing their businesses and entrepreneurial experiences. The subtle element of interest is the entrepreneurial experience. This appreciation of the experience is an indication of realism on the part of the entrepreneurs; an understanding that not every business concept that is brought forth to be incubated or accelerated will ultimately be a success, but that there is value in aspects of the experience, possibly intrinsically or extrinsically, for future endeavors. This observation is the unique element that is missing when other research just measures raw output numbers (i.e., jobs created, capital raised) of an incubator's or accelerator's portfolio; these metrics are important, but they may lose the bigger picture. The positive incubator or accelerator experience for entrepreneurs may benefit society in many ways, such inspiring and improving the odds of future business concepts and educating individuals to be more business-minded like the benefits of an MBA. As noted by their willingness to recommend, they may be planting the seeds for future entrepreneurs to utilize incubators or accelerators to launch a successful business, even if their incubated business failed. In summary, as other researchers have noted, the debate should not be whether these institutions are valuable and should remain part of the

entrepreneurial ecosystem. Energy is better spent recognizing what aspects of the incubator and accelerator offerings are a success and how to improve upon factors that enable them to deliver even higher value to entrepreneurs.

FINDING #2: For Outcome Value, specific outcomes vary by BIA type; while for Recommendable Value, users view BIAs useful for early- and mid-stage businesses.

Another key finding is that although entrepreneurs do not significantly differ in their overall recognition of the value of incubators and accelerators, there are differences in specific outcome types. Beyond just indicating whether the programs provide value toward improving their business outcomes, the entrepreneurs evaluated seven types of outcomes, namely, 1) speed to market, 2) profits and margins, 3) growth and expansion, 4) market identification, 5) capital funding, 6) reduced expenses, and 7) better product or service. For both users of incubators and accelerators, entrepreneurs aligned with improvements to ‘profits and margins’ being a least likely outcome; but there are differences in their most impactful outcomes. Entrepreneurs participating in incubator programs rate the impact of ‘reduced expenses’ statistically more positive than entrepreneurs attending accelerator programs, and this ‘reduced expenses’ type was top-ranked (i.e., via mean score) for incubator users amongst the other types. Entrepreneurs participating in accelerator programs rate the impact of ‘capital funding’ statistically more positive than entrepreneurs attending incubator programs; this is a top-ranked type for accelerator users along with ‘market identification’.

IMPLICATIONS: The implications of these finding are reinforcing the differences expected between incubators and accelerators. Incubators, since their inception, have positioned themselves as institutions that assist entrepreneurs through such benefits as affordable office rental space. In that same vein, accelerator models

are typically known to offer access to initial funding, sometimes in exchange for equity, to their entrepreneurs in exchange for accelerating the development of the business. Even with the emerging ‘hybrid’ incubators/accelerators models as noted in the literature, it does seem that these two distinctions remain mostly unchanged. The difference is important for entrepreneurs as they consider which program to pursue. If they are interested in maximizing their reduction in expenses, they may want to target an incubator. In contrast, if an initial capital infusion is more important than reducing expenses, they may wish to seek an accelerator.

FINDING #3: Program Value varies based upon entrepreneur’s education and business experience level by BIA type.

Before moving on to the second research question, I take a moment to discuss demographic differences related to value. In the research, the entrepreneurs share many characteristics about their businesses and themselves. For most of the characteristics there is no statistical difference of interest, but there are two that I want to highlight based on interaction plots. The first observation is that entrepreneurs with lower educational degrees tend to favor incubators over accelerators in delivering overall program value; but as education level increases the entrepreneurs tend to attribute program value between incubators and accelerators equally. In conjunction with this first observation, I note that the entrepreneurs using incubators and accelerators are well-educated with greater than 85% have a bachelor’s degree or higher; and there is not a significant difference between the education levels of users of incubator and accelerator programs. The second observation is that entrepreneurs with a more considerable amount of business experience tend to favor incubators over accelerators in delivering overall

program value; and as business experience decreases the entrepreneurs tend to attribute program value between incubators and accelerators equally. In conjunction with this second observation, I note that the entrepreneurs rate themselves as moderately experienced at starting/growing businesses and there is not a significant difference in this assessment between users of incubator and accelerator programs.

IMPLICATIONS: These observations potentially allude to some underlying differences between incubators and accelerators that influence the preferences based on education and business experience. The data collected in this study does not provide deeper insights into these unexpected interactions. These findings present an opportunity for future research as I do not find evidence of these types of observations in the extant literature. One other implication, due to a lack of presence; namely that other demographic factors (i.e., age, business tech level, race, gender) did not notably influence program value.

V.1.2 Research Question 2: Contributions to Value

Turning to research question two, I highlight the key findings that influence the positive value brought forth in research question one. In the research, I explore three major independent constructs predicting program value; they are program resources, program use characteristics and program fit.

FINDING #4: Program resources are the largest predictor of impact on Program Value.

I begin with program resources as it has the largest predictive impact on program value. In the research, the measures of program resources are knowledge, funding, infrastructure, technology, market, and culture. From the quantitative model analysis, knowledge resources (i.e., mentors, access to experts, coaches) rank as the top indicator, followed by culture (i.e.,

entrepreneurial environment, like-minded network) in second. This observation strongly aligns with the qualitative assessment, where networks (i.e., connections, contacts, introductions) and mentors (i.e., mentorship, advice) ranked as the top two most valuable resources cited. Between users of incubators and accelerators, there is no statistical difference in means for the cultural resources, but for knowledge resources, there is a difference; users of accelerators have statistically higher means for knowledge resources. The findings get even more interesting when examining the funding and infrastructure resources. Users of accelerators rate funding resources as a statistically higher indicator, while incubator users rate infrastructure resources as a statistically higher indicator. Funding has another important dimension. When users are asked qualitatively, which program resources are most valuable and which resource are inadequate, they note funding in both cases.

IMPLICATIONS: Overall, the implications of program resource being the greatest predictor of program value aligns with the resource-based theory.

Entrepreneurs seek incubators and accelerators to garner a resource-based competitive advantage to increase their odds of business growth and survival.

This observation aligns with extant literature (Regmi, Ahmed, & Quinn, 2015).

Another implication is that as incubators and accelerators evolve to improve services, it is important that they maintain strong human capital (i.e., knowledge from mentors, experts) and network interactions as it is currently driving great value as the predominant type of resource. This implication aligns with extant literature (Van Rijnsoever et al., 2017). Lastly, the differences between incubator and accelerator users regarding infrastructure and funding resources align with

earlier implications discussed above regarding reduced expenses and capital funding, respectively.

FINDING #5: Program Use indicators vary by BIA type; Task Cost Effort variables not influential.

Now, I turn my attention to program use characteristics as an influencer of program value as there are several findings. Ease of use of program resources is the most influential indicator, and it is very favorable for both incubator and accelerator users. Ease of entry program entry and program structure are a different story as there is a statistical difference between incubator and accelerator users. Accelerator users indicate it is more difficult to enter the program. In the model, this barrier to entry is favorable regarding value. Also, accelerator users indicate that their programs had greater structure than incubator users. In the model, greater structure is favorable regarding value. Lack of program structure, even post-program, is noted by entrepreneurs in the qualitative analysis as being inadequate. Lastly, the program characteristics related to the task effort theory are not notable influencers.

IMPLICATIONS: One primary implication related to program characteristics is that entrepreneurs value that the programs are selective regarding candidates; this sense of scarcity and the value of a vetted internal network seemingly connects to the concept of competitive advantage which is fundamental to resource-based theory. But the administrators must note that once they accept the entrepreneurs into the program, it's important that there is guidance (i.e., structure) and minimal friction to the effective use of resources.

FINDING #6: Users of multiple BIAs express greater Business Fit to programs; Program Rank is not found to significantly influence Program Value.

Lastly, I cover key findings related to the final significant construct, program fit. Both indicators of program fit, namely, fit of the entrepreneur (i.e., culture, expectations) and fit of the business (i.e., concentration, industry) to the incubator or accelerator program are significant; but fit of the business was the primary driver. Interestingly, users that had previously participated in more than one incubator or accelerator program, in contrast to first-time users, were statistically different; they rated business fit higher. Another point of interest is that program rank was not significant in the model in terms of driving the broader realization of value.

IMPLICATIONS: The implication to an entrepreneur is there is value in taking the time to ensure one's business is a fit to the incubator or accelerator; a better fit may lead to better outcomes (i.e., value). However, entrepreneurs may find an acceptable fit in nearby, larger metropolitan markets without traveling far to top-ranked programs; entrepreneurs can likely garner value just by ensuring the BIA program excel at many of the characteristics highlighted in the research, such as strong knowledge resources. Another consideration as to why program rank may not be showing a difference is due to trade-offs. For example, it may be possible that higher ranked programs have higher levels of sacrifice (e.g., such as percent of equity given up), while lower ranked programs have fewer trade-offs. Another consideration is that most new business concepts are not going to be revolutionary, so the need for top-ranked programs may not be necessary for most entrepreneurs. Both considerations may be good subjects for future research.

V.2 Limitations & Future Research

This research presents many relevant findings and implications, but as with any research, there are limitations. One limitation is that this research focuses on incubators and accelerators

only in the United States. I expect that some of the findings would apply to other developed countries that have a similar entrepreneurial environment and ecosystem structures like the United States. Thus, similar methods as used in this research can be used in future research to explore comparable or dissimilar countries.

Another opportunity to improve the research would be to collect a larger sample and look at other elements that I did not include due to parsimony. My research has good breadth in that it encompasses data from incubators and accelerators from across the United States and the sample is large enough to capture the statistical significance of many important variables. But the sample is still relatively small in comparison to the population, especially for incubators. Future researchers should consider capturing a larger sample that could enable deeper analysis, into such elements as regional differences as well as additional program and entrepreneur characteristics.

Lastly, this research focused on a population of entrepreneurs that are current or previous users of incubators and accelerators. It is interesting future research to understand the perspective of entrepreneurs that are ‘not considering’ incubators and accelerators; why are they not considering them. Also, explore the viewpoint of entrepreneurs that ‘considering, but have not’ used incubator or accelerator yet; why not and what are the barriers.

V.3 Contributions

As per the introduction of this research, the United States is in a continuous battle to stimulate new business creation and growth as positive business dynamism is fundamental to a prosperous economic environment. For several decades, business incubators and more recently business accelerators have positioned themselves in the entrepreneurial ecosystem as robust tools for inspiring and fostering startups. Yet, there is still debate over the efficacy of these programs,

and what aspects about them drive value. This research set out to bring additional clarity to these questions, at least from the perspective of the entrepreneurs that use the business incubator and accelerator services. In this regard, I have brought forth rich findings that contribute to the academic conversation (i.e., theory) as well as provides valuable information to the practitioner community.

V.3.1 Contributions to Theory

In the academic realm, this research adds to the scholarly body of knowledge about business incubators and accelerators. Several of the contributions are as follows:

- First, the research contributes to the literary debate about the efficacy of BIAs. As discussed, the extant literature takes all three positions regarding the efficacy of BIAs, namely negative, neutral and positive. This research provides definitive support for the positive position based on first-hand feedback from BIA users. I affirmed value through three measures, namely business outcome value, entrepreneurial experience value and willingness to recommend. The entrepreneurial experience value is particularly interesting in that it elevates a space for research that can explore the benefits of BIAs beyond just the raw output measures of an incubator's or accelerator's portfolio, such as capital-raised. It seeds investigation into successive businesses post the BIA experience. Not only does this research affirm that entrepreneurs value BIAs, but it provides insight into the measures. Such as 'growth and expansion' is the top business outcome value. Or for example, that the entrepreneurs recommended mid-stage businesses over early-stage businesses as users of BIAs, which is counter to some research.

- Second, the research establishes a theoretical variance model for predicting incubator and accelerator program value. It identifies specific constructs and the underlying measures of importance. Having a model is useful, such as having a tool for comparisons. For example, the model can be used to compare BIA groupings in different countries. The model sets a foundation for adaptation, such as test the introduction of new variables and see how they perform against previously validated variables.
- Third, the research provides insight into two theories, namely resource-based theory, and task cost theory. The study reinforces, as in other research, the importance of resource-based theory as an essential tool in understanding drivers for new business development. The research specifics which resources are most important such as knowledge and culture. In contrast, the research did discover that task cost theory, at least as used in this approach, is not particularly influential in this setting or context.
- Lastly, the research provides comparisons between incubators and accelerators. In my review of extant literature, I found few if any direct comparisons on the differences and similarities in the value and the factors influencing the value of BIAs between incubator and accelerator users. Most research focuses on one or the other; and typically, just focuses on incubators. The learning opens a rich space for understanding the drives and benefits of the differences.

V.3.2 *Contributions to Practice*

Many of the contributions that I highlighted in the above theory section applies to practice, but there are additional benefits specific to practitioners. I segment the contributions by societal groups, namely entrepreneurs, BIA administrators, and sponsors:

V.3.2.1 *Entrepreneurs*

First is educating entrepreneurs. This study encourages entrepreneurs that have early-to-mid-stage businesses to consider incubators and accelerators as a viable option for progressing their firms and improving their entrepreneurial experience. Of course, not all programs are created equal, but overall BIA users find the programs to be broadly favorable and a worthwhile pursuit. The research findings should help new business founders to understand, from the perspective of fellow entrepreneurs, some of the benefits, weaknesses, differences and potential outcomes from participating in these programs so they can make educated choices and set reasonable expectations. Another consideration is for those entrepreneurs that may have had a poor experience at a BIA. The research may help them understand why they had a poor experience; possibly misaligned expectation or fit. This research should encourage them to possibly try the experience again but be selective based on some of the factors highlighted in this research. Another point of encouragement is that the research did not find significance in how highly rated the BIAs programs are; so, if the program fulfills the key factors noted by previous users, new users will likely garner value from the program; this is important to note as entrepreneurs consider local programs. This knowledge aims to foster and improve the speed of business creation through better-informed entrepreneurs.

V.3.2.2 Administrators

Incubator and accelerator program administrators should be encouraged by this study's findings. It positively reinforces that entrepreneurs value their efforts to create supportive entrepreneurial environments. Even more importantly, the study provides insight into what the entrepreneurs find beneficial about the programs and where opportunities for improvement may lie. For example, from this research administrators should know that the human capital resources (i.e., their mentors, experts, advisors to the founders) and the culture (entrepreneur environment, networking openness) is paramount. On the improvement side, for example, the findings indicate that post-program follow-up and help driving early revenue are opportunity areas. Administrators should note the high propensity for previous users to recommend BIAs, so they may want to tap into this when considering marketing of their programs. In understanding these factors and building upon their underlying themes, administrators can continue to progress their programs and recruitment, ultimately inspiring more entrepreneurs and increasing positive business dynamism.

V.3.2.3 Sponsors

Most sponsors (i.e., government, investors) and supporters (i.e., mentors, universities, external service providers), especially voluntary and philanthropic ones, want to know that their contributions to BIA programs are making an impact. This research affirms that the BIA users greatly value the programs and believe that it is improving their business outcomes; thus, sponsors and supporters are making an impact. For investors, this research does not provide financial metrics for this value, but it does affirm that there is a societal value that does contribute to prosperity.

VI CONCLUSIONS

In the United States, the business creation rate has been declining for decades for various debatable reasons. Regardless of the reason, most agree that the phenomenon is not desirable. Across the U.S., progressive economies seek ways to foster entrepreneurial ecosystems to attract entrepreneurs and increase their odds of starting and growing successful firms. In recent years, business incubators and accelerators have become prominent support organizations in entrepreneurial ecosystems. This research sought to explore two research questions, namely 1) do entrepreneurs value incubators and accelerators? and 2) what contributes to this value? The sample population consisted of entrepreneurs in the United States that are currently participating or have previously participated in incubator or accelerator programs. The entrepreneurs provided input to these research questions through an extensive online survey. The respondent answers were primarily analyzed through quantitative methods, but then supplemented with qualitative analysis. The results indicate that the entrepreneurs find these programs very valuable for improving their business outcomes. The value was so substantial that these entrepreneurs felt the program experience to be worthwhile regardless of whether their businesses ultimately survived. Moreover, these entrepreneurs strongly recommend their usage to fellow entrepreneurs. Many factors contributed to this value, but knowledge resources (i.e., mentors, access to experts, coaches) and culture (i.e., entrepreneurial environment, like-minded network) topped the list. The goals of the research were achieved; providing valuable insights to the academic and practitioner communities alike.

APPENDIX

A1. Summarized List Of Main Survey Questions

This list is not inclusive of all questions, and some the questions below had multiple sections.

1. What is the highest degree or level of schooling you have completed? *Select one.*
2. Which statement BEST describes your interaction with incubators/accelerators? *Select.*
3. If we may contact you for clarification, please provide your contact details below.
4. Select the sector(s) that BEST classifies your business. *Select all that apply.*
5. Rate the level of technological innovation that BEST describes your business offering.
6. Which of the following BEST describes your experience at starting / growing businesses.
7. What is the name of the incubator/accelerator?
8. In which U.S. state is this incubator/accelerator located?
9. In which city is this incubator/accelerator located?
10. How long have you been in the program (i.e., using services) of this incubator/accelerator? And how long do they allow you to be in the program?
11. Does this incubator/accelerator focus on technology startups?
12. Describe any other focus for the incubator/accelerator, such as race, gender, sector, etc.
13. Why did you choose this specific incubator/accelerator?
14. For your most recently used incubator/accelerator how structured is or was the program?
15. Which answer BEST describes the program you are using or have used most recently?
16. Which resources are or have been important, even if not offered at your incubator/accelerator?
17. Rank order resources by MOST IMPORTANT

18. What IMPACT has each resource at the incubator/accelerator had on progressing your business?
19. How much do you AGREE or DISAGREE with each of the following statements as they pertain to the incubator/accelerator?
20. To use the resources at the incubator/accelerator, indicate your LEVEL OF EFFORT OR SACRIFICE.
21. How valuable has the incubator or accelerator been toward improving outcomes for your business, thus far?
22. More specifically, what types of OUTCOME IMPACT, thus far, have you experienced?
23. Based on business value, how likely would you be to recommend the incubator/accelerator to MOST entrepreneurs?
24. Did you complete/graduate from the incubator or accelerator program?
25. Which statements BEST describes the status of the business you sought to grow at the incubator or accelerator? *Select all that apply.*
26. How well do you feel you and your business fit at the incubator or accelerator?
27. What incubator/accelerator resources or help has been most valuable to you?
28. What desired help was not received or inadequate from the incubator or accelerator?
29. List at least one OTHER incubator/accelerator used beyond the one you noted earlier, if applicable.
30. Please share any additional comments you have in regard to incubators/accelerators.
31. What is your gender?
32. What is your year of birth?
33. Which of the following best describe your ethnicity (or race)? *Select all that apply*

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VITA

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