

Role of Mentors in Developing the Social Competencies (SC) of their Protégée-Entrepreneurs
(PE) in High-Tech Incubators (HTI)

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AUTHOR'S DECLARATION

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Role of Mentors in Developing the Social Competencies (SC) of their Protégée-Entrepreneurs (PE) in High-Tech Incubators (HTI), Master of Science in Management (MScM) 2017
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ABSTRACT

High-tech incubators offer their entrepreneurs mentoring services to help them achieve goals faster. In a successful mentoring relationship protégées learn from the statements, actions, questions, and communication styles of their mentors. Mentors can play an important role in developing their protégées' social competencies, which allow them to increase their social capital. This research tests a predictive model for the contribution of mentors to the development of their protégées' social competencies in a high-tech incubation environment. The predictor variables of the model are the active communication-time between mentors and their protégée-entrepreneurs, and the age of a mentoring relationship, referred to as elapse-time. The outcome variable is the development of social competencies of protégée-entrepreneurs. Moreover, the levels of trust from protégée-entrepreneurs towards their mentors might moderate this time-social competency relationship.

The social competencies of individuals involve six elements: emotional expressivity, emotional sensitivity, emotional control, social expressivity, social sensitivity, and social control. The Social Skills Inventory (SSI), an established psychometric scale that captures all six dimensions of social competencies, is used to test this model. After the participation of 99 protégées-entrepreneurs from 10 incubators at Ryerson University, a new seven-item trust scale has been validated; however, the roles of elapse-time and communication-time in developing the social competencies of protégée-entrepreneurs are not supported. Surprisingly, after the verification of the SSI, it turned out that it is not valid to the participating sample set. In conclusion, despite the claimed generalizability of the SSI, it is now questionable, and the creation of a social competency scale for incubated entrepreneurs is an opportunity for future research.

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RESEARCHER'S STATEMENT

At a certain point in my career, I was an entrepreneur running my own business. Because I came from an environment with very few entrepreneurs, I had little training; consequently, I had more failures than successes in my business. I realized that my peers with good mentors had an advantage over me. Since then, I had a burning question: “how can a society systematically empower individuals to become competent entrepreneurs?”

I believe in entrepreneurship as a social force that can provide solutions for current social, economic, and environmental challenges. Equity, social inequality, and public education are examples of current social challenges. Poverty, job creation, and public health are examples of current economic challenges. Pollution, global warming, and waste disposal are examples of current environmental challenges. Throughout history entrepreneurs have been able to provide solutions to similar challenges and develop their societies.

I believe an effective way to overcome these challenges is to engage the whole population in offering innovative solutions. Through training and mentoring programs, interested individuals can acquire entrepreneurial competencies, which are essential for individuals to become competent entrepreneurs, who can recognize opportunities and develop a business model around them. While entrepreneurs are not limited to creators of profit driven start-ups, many entrepreneurs are socially driven activists as well; however, both types should be competent as entrepreneurs to succeed.

I want to research entrepreneurial competencies because they are necessary for the training of entrepreneurs, and of the entrepreneurial competencies, social competencies have a direct impact on the entrepreneurs' social capital. I hope that my small contribution to the body of knowledge has a positive impact on the lives of people and on their societies.

INTRODUCTION

In a successful mentoring relationship protégées learn from the statements, actions, questions, and communication styles of their mentors (Goleman, 2000; St-Jean & Audet, 2009). A protégée observes her mentor's actions and reflects on them, or a mentor asks challenging questions for his protégée to reflect on. Knowledge is exchanged through verbal and nonverbal communication. During the early days of a successful mentoring relationship, trust between mentors and their protégées begins to develop, permitting transparency and increasing the exchange of information. Higher levels of trust improve the efficacy of communication. When protégée-entrepreneurs trust their mentors, they willingly expose their vulnerability in order to benefit from the mentoring relationship. This leads to a development of their competencies because of a successful mentoring relationship.

This research argues that factors influencing the development of the social competencies of protégées are elapse-time, communication-time, and trust. While elapse-time and communication-time impact the protégée-entrepreneurs' development of their social competencies, trust moderates the mentoring relationship and increases its efficacy. The more the protégées trust their mentors, the faster their social competencies develop.

In high-tech incubators, mentoring is a common service. Mentors are entrepreneurs that have been successful in building a start-up business (Mian, 1997; Tamasy, 2007), and thus, have already experienced the entrepreneurial process. Being successful entrepreneurs from the same industry, mentors can support their protégées with valuable market knowledge. Mentors have developed their own social capital as a result of building their start-up businesses (Baron & Markman, 2003), and this social capital might be valuable to their protégées. Mentors are considered vital members of their protégées' social capital, and can help their protégées develop their social capital. This might be a benefit that protégées expect from them. However, mentors

might not be encouraged to introduce their protégées to influential individuals if their protégées are not socially competent. By introducing socially incompetent protégées to their networks, mentors risk their reputations and current social capital. However, socially competent protégées add value to the social capital of their mentors.

Drawn out from previous studies, communication-time, elapse-time, and trust describe factors that help mentored entrepreneurs develop their social competencies. This thesis is a quantitative deductive study to test the predictability of the entrepreneurs' social competency development based on communication-time, elapse-time, and trust. Consequently, there are two research questions:

1. How can a mentoring relationship help develop the social competencies of protégée-entrepreneurs with time?
2. Does trust between protégées and their mentors moderate the efficacy of time in developing the social competencies of protégée-entrepreneurs?

Answering these questions can empower new entrepreneurs. Enabling creative individuals with entrepreneurial competencies increases their probability of developing a successful start-up business. Many individuals spot entrepreneurial opportunities in their environments, but few of them become successful entrepreneurs. Sometimes this is because the opportunities are not scalable, but often it is because the creative individuals are incompetent and cannot scale their opportunities. Research on entrepreneurial competencies and mentoring entrepreneurs can prepare creative individuals to better exploit their entrepreneurial opportunities. Moreover, competent entrepreneurs can spot more existing economic and social challenges, and offer solutions to these challenges. Whether entrepreneurial opportunities are

economic or social, they require competent entrepreneurs to develop them into a sustainable business.

This thesis is divided into five chapters. This first chapter has introduced the research and outlined the research questions. The second chapter reviews theories from the literature on entrepreneurship, the entrepreneurial process, the entrepreneurial environment, high-tech incubators, mentoring, competencies, entrepreneurial competencies, social capital, and trust. The third chapter discusses the methodology used in this research, the paradigm behind the methodology, the operationalisation of the research, the research design and method, the sampling, and data collection. The fourth chapter presents the results from the data collected. The fifth chapter examines the findings and potential avenues for future research.

LITERATURE REVIEW

The scholarly field of entrepreneurship studies business opportunities, enterprising individuals, the process of creating a business opportunity, the process of developing the opportunity, and the environment affecting the process and enterprising individual (Venkataraman, 1997). Entrepreneurial studies search for answers to the following questions: “(1) why, when, and how opportunities for the creation of goods and services come into existence; (2) why, when, and how some people and not others discover and exploit these opportunities; and (3) why, when, and how different modes of action are used to exploit entrepreneurial opportunities”(Shane & Venkataraman, 2000, p. 218).

Enterprising individuals discover business opportunities and develop them into goods and services (Kirzner, 1997). Individuals that create and exploit the opportunities become entrepreneurs. The support offered for entrepreneurs enables them to exploit their recognized opportunities. Motivation is a major driver for individuals to become entrepreneurs (Bipp, Steinmayr, & Spinath, 2008; Cooper, 1985), and their relevant knowledge and entrepreneurial

competencies are fundamental requirements for their success (Shane, 2000b). Entrepreneurial competencies enable entrepreneurs to successfully overcome the various stages of the entrepreneurial process in order to build a prosperous start-up business (Chell, 2013). Therefore, research on empowering entrepreneurs with entrepreneurial competencies is a fundamental area of entrepreneurship research (Mitchelmore & Rowley, 2010). However, before discussing entrepreneurial competencies, it is important to review the importance of entrepreneurs and their role in the entrepreneurial process.

The Entrepreneur

Entrepreneurs pursue opportunities regardless of their currently controlled resources. Social entrepreneurs pursue social opportunities while commercial entrepreneurs pursue commercial opportunities (Stevenson & Jarillo, 2007). Commercial entrepreneurs build start-ups that are beneficial to the economy. Through their start-ups, they can create employment opportunities, introduce new innovations, contribute to economic growth, and achieve self-satisfaction (Van Praag & Versloot, 2007). They discover resources, create a process to exploit them, and offer them to customers (Kirzner, 1997). Entrepreneurs could be categorized as productive, unproductive and destructive. Productive entrepreneurs offer new innovative goods and services that customers already know and demand. Unproductive entrepreneurs exploit socially undesirable opportunities such as organized crime. Lastly, destructive entrepreneurs introduce innovative goods or services that lead to major changes in industries and disrupt economies. Entrepreneurs of different categories influence the economy differently. Socio-economic policies can favor one category of entrepreneurs over the other (Baumol, 1996).

Neoclassical models of economics are based on the assumptions of scarcity and equilibrium. Those assumptions ignore the power of the individual in the economy (Kirzner, 1997). The Austrian School of economics refute those assumptions and recognize the role of

individuals in shaping the economy (Hayek, 1945; Mises, 1949; Schumpeter, 1934). The assumption of scarcity is not valid according to Austrian economics. Although there is a scarcity of natural resources, there is a plethora of combinations that suppliers can form out of the current resources to create a huge number of products. Also, the assumption of supply and demand equilibrium is not realistic according to Austrian economics. The market being in constant activity implies that there is uneven distribution of information among individuals. This results in a market not being in equilibrium. The neoclassical school of economics does not take into consideration the role of entrepreneurs in the economy although the entrepreneurial activity can disrupt the market and consequently the economy (Baumol, 1996).

One of the challenges Austrian economics faces is quantifying its concepts (Kirzner, 1997). Unlike neoclassical economists, Austrian economists base their economic models on entrepreneurs. It is difficult to understand human behavior and quantify it. Human behaviour is complex and multidimensional which makes it difficult to isolate the actions and study them without interferences. Human behaviour is subjected to several influencers that interact together at the same time. To further understand the behavior of entrepreneurs and their evolution during a critical stage of new start-ups development, it is important to discuss the entrepreneurial process and its stages (Ardichvili, Cardozo, & Ray, 2003).

The Entrepreneurial Process

“Entrepreneurship is a process by which individuals-either on their own or inside organizations-pursue opportunities without regard to the resources they currently control” (Stevenson & Jarillo, 2007, p. 27). The entrepreneurial process is a journey of turning an opportunity into a sustainable business. The process starts when an entrepreneur spots an opportunity (Nicolaou, Shane, Cherkas, & Spector, 2009; Shane & Nicolaou, 2015), continues with the entrepreneur developing this opportunity, and ends with the opportunity becoming a

successful start-up. The entrepreneurial process is also referred to as the opportunity recognition and development process (Ardichvili & Cardozo, 2000). In the opportunity recognition process, an entrepreneur produces a product or service, and in the opportunity development process, an entrepreneur constructs a new sustainable start-up business around this product or service. The entrepreneurial competencies required to be successful in each process are not identical (Chell, 2013; Mitchelmore & Rowley, 2010).

Opportunity recognition depends on an entrepreneur's previous knowledge, experiences and alertness in spotting opportunities. At this stage, entrepreneurs evaluate the potentials of their opportunities and identify their markets (Baron & Ensley, 2006; Cha & Bae, 2010; Gaglio & Katz, 2001). Opportunity development, is the process of constructing the business model and writing the business plan to bring the service or product developed to the markets (Argyris & Schön, 1997). The opportunity development depends on the environment of an entrepreneur. Entrepreneurs interact with their environments in several ways such as learning (Corbett, 2007), researching, testing, networking (Birley, 1986), selling, buying, and recruiting (Ardichvili et al., 2003; Singh, 2001). During the opportunity development process, entrepreneurs expansively interact with their environments. Therefore, it is important to discuss the entrepreneurial environment, and its impact on the entrepreneurial process.

The Entrepreneurial Environment

The entrepreneurial environment can be a significant source of inspiration for opportunity creation (Shane & Kolvereid, 1995; Tang, 2008). Entrepreneurs can spot market-gaps as a result of their previous experiences and specific knowledge (Harper, 2002; Valliere, 2013). From available resources, they can build solutions in the form of products and services. Knowledge corridors emerge from the entrepreneurs' unique experiences enabling them to recognize opportunities (Shane, 2000b). To develop their opportunities, entrepreneurs must build

sustainable business models. In order to do that successfully, entrepreneurs need to acquire knowledge on how to build, manage, and grow a start-up business (Mitchelmore & Rowley, 2010). If the environment is transparent and supportive and has adequate recourses, success is more likely. The environment can take several forms such as political (Patton & Marlow, 2011), economic (Feldman & Audretsch, 1999), social (Hayek, 1945), technological (Hisrich & Smilor, 1988), and legal (Avnimelech, Schwartz, & Bar-El, 2007). Therefore, entrepreneurs can use their environments to leverage their start-ups.

An environment that supports a new start-up is an environment of success (Shane & Kolvereid, 1995). Being aware of the importance of the environment for entrepreneurs, businesses and societies create supportive environments in the form of specialized industrial clusters. The high-tech industry is a fast-growing industry with disruptive potentials. Thus, it attracts many new entrepreneurs. Business incubators are supportive environments for new entrepreneurs (Cooper, 1985), and high-tech incubators are an example of a specialized type of business incubators (Aernoudt, 2004).

High-Tech Incubators

Incubators are environments to support individuals to start and grow their businesses (Aernoudt, 2004). Incubators are of several types. They can be classified based on their stakeholders or based on their objectives. Some incubators are affiliated with universities to help graduates develop their ideas into businesses, while others can be affiliated with governments or even private institutions (Mian, 1997). Incubators have been criticized for failing to meet their objectives. Incubators are criticized of becoming not more than office space provider (Peters, Rice, & Sundararajan, 2004). There are also claims that success rates for start-ups at incubators are not better than outside incubators (Tamasy, 2007). However, they are still considered one of the best available tools for business development and start-ups creation (Avnimelech et al., 2007;

Patton & Marlow, 2011). Incubators are supporting environments for entrepreneurs throughout the opportunity development process (Aernoudt, 2004; Patton & Marlow, 2011; Peters et al., 2004).

In ancient Greece, individuals seeking visions would perform rituals in the temples with the hope of being inspired by the Gods. This act was most common in the temple of Aesculapius the God of medicine, and it was called *incubatio*. Later, the word incubator appeared in modern medicine to describe the chamber used to keep premature newborn infants to follow-up their early development process with close supervision. The result of this process was a higher survival rate of premature newborns.

Similarly, business incubators are also temporary protective environments for new start-ups to overcome their early challenges (Aernoudt, 2004). Start-ups are most vulnerable when entrepreneurs are in the process of developing their business models. At this stage, entrepreneurs have already invested time and money putting themselves under emotional and social pressure (Cha & Bae, 2010). Well-designed business models leads to sustainable growing businesses (Cooper, 1985). Business incubators can be one of the safest environments for entrepreneurs to improve their products and services, organize their teams, write their business plans, approach their first customers, and finance their operations (Peters et al., 2004). Consequently, it is also the place where new entrepreneurs could work on developing their competencies to successfully achieve their objectives (Patton & Marlow, 2011).

To understand the role of incubators as an entrepreneurial environment, it is more relevant to classify them based on their objectives rather than on their stakeholders (Feldman & Audretsch, 1999). As demonstrated in table 1, general business incubators are environments to support new start-ups and create new employment regardless of the industry. Regional

incubators are general business incubators funded by local governments to encourage local business creation. Social incubators support vulnerable populations with low employment capacities in creating their start-ups. High-tech incubators are industry specific incubators that support start-ups in the various fields of technology such as biotechnology, information technology, and environmental technology (Aernoudt, 2004).

Table 1: Typology of business incubators (Aernoudt, 2004, p. 128)

Incubator	Main Philosophy: Dealing with	Main Objective	Secondary Objective	Sectors Involved
General Business	Business Gap	Create Start-ups	Employment Creation	All Sectors
Regional	Local Disparity	Regional Development	Business Creation	All Sectors
Social	Social Gap	Integration of Social Categories	Employment Creation	Non-Profit Sector
Technology	Entrepreneurial Gap	Create Entrepreneurship	Stimulate Innovation, Technology Start-ups	Recent Technology, IT, Biotechnology

High-tech incubators support entrepreneurs in developing their ideas and building their high-tech start-up businesses. Many high-tech incubators are closely related to educational institutions and high-tech clusters (Avnimelech et al., 2007; Bellotti et al., 2012; McAdam & McAdam, 2008). General business incubators are facing challenges. Many of them are turning out to be an office renting space funded by the public sector (Peters et al., 2004). High-tech incubators are more successful than general business incubators because they offer their start-ups more strategic advantage (Feaser & Willard, 1990), and more relevant mentoring and networking services (Avnimelech et al., 2007; McAdam & McAdam, 2008). Therefore, it is important when studying incubators as an environment for start-ups to identify the industry since the industry

dynamics, such as customers, suppliers, consultants, and culture, interfere with the opportunity development process. Among the industries, the high-tech industry provides the economy with the most recent destructive entrepreneurs, and the high-tech incubators' objectives are to identify the "entrepreneurial gap" and "create entrepreneurship" (Peters et al., 2004, p. 128).

Incubators' main objective is to prepare new start-ups to successfully stand alone as quickly as possible (Peters et al., 2004). Consequently, incubators can measure their performance based on survival rates of graduates, rotational rates, and perception of entrepreneurs (Aernoudt, 2004; Peters et al., 2004). Incubators offer three categories of services: infrastructure, coaching, and networking. The high-tech incubators, through their infrastructure-services, offer the new start-up with office space and reliable supporting communication services. It is in a premium location and costs much less than outside the incubator. It is an open space with open interaction among other start-ups. Many start-ups are attracted to this service, and many start-ups decide to extend their stay due to this service (Cooper, 1985; McAdam & McAdam, 2008; Peters et al., 2004).

Mentoring is another valuable service of the high-tech incubators. The opportunity to work with an experienced mentor that is a successful entrepreneur brings added value to start-ups (Aernoudt, 2004; McAdam & McAdam, 2008; Peters et al., 2004). The mentors being entrepreneurs implies they have been through the opportunity recognition and development process (Bisk, 2002; St-Jean, 2012).

Networking is another service that incubated entrepreneurs benefit from. With the open space culture, start-ups are in an ongoing interaction with each other. This allows them to exchange ideas, services and information. Incubators also arrange for networking activities where potential suppliers and potential customers might participate (Avnimelech et al., 2007;

Birley, 1986). Also, incubators can become an environment where start-ups are introduced to potential investors. Mentoring programs might be a source of networking activities as well because mentors also have their own networks that might benefit their protégées.

In the case of high-tech incubators, mentors come from the same industry which implies more benefits for entrepreneurs. They benefit from a business mentor and an industry expert. This is also one of the most valuable services high-tech incubators offer their start-ups (Aernoudt, 2004; Moulson, 2015; St-Jean, 2011). For a better understanding of the importance of this service and the influence mentors have on the entrepreneurial competency development of protégée-entrepreneurs, it is important to examine mentoring as a service for incubated entrepreneurs.

Mentoring

Mentoring is an important service offered by incubators (Peters et al., 2004). New entrepreneurs appreciate the mentoring service offered (Hisrich & Smilor, 1988) since mentors are more experienced entrepreneurs who dedicates time to help their protégées develop their skills and achieve their goals (St-Jean, 2012). Mentoring is a coaching technique (St-Jean & Audet, 2009) also used successfully in corporate business where new appointed employees would be coached by an experienced mentor (Moulson, 2015). However, in this research mentoring is discussed in an entrepreneurial context, and protégées are new entrepreneurs in high-tech incubators.

Experienced mentors give time to communicate with their protégées on a regular basis. This time is dedicated to keep their protégées on track (St-Jean, 2011). The mentoring relationship is a protégée-centered relationship. Protégées are expected to have a development plan tailored based on their personal objectives, motivations, and ambitions. Mentors serve as coaches helping their protégées develop their goals, evaluate their progress, and stay focused

(Goleman, 2000; St-Jean & Audet, 2009). The mentoring approach revolves around asking protégées challenging questions to highlight difficulties or clarify vague ideas. Mentors make sure their protégées have clear and valuable objectives. After the objectives are set, mentors help their protégées clarify the steps for achieving them. Mentors alert their protégées when they deviate from their objectives keeping them focused. Being focused also means setting a clear time table for expected results. Mentors also help their protégées identify their own strengths and weaknesses. Mentors use their relevant experiences in business creation to guard their protégées from common mistakes (Bagheri & Pihie, 2010). Mentors may share their networks, their knowledge, and their experiences with their protégées.

In entrepreneurship, mentors are entrepreneurs that are successful in identifying opportunities and building successful start-ups (Cha & Bae, 2010). In general business incubators, although mentors are entrepreneurs, mentors might not be from the same industry as their protégées. The mentoring relationship between mentors and their protégées in general business incubators differ from those in industry specific incubators (St-Jean, 2012). The mentoring sessions becomes more industry specific when both parties come from the same industry; however, communication may lack for transparency due to potential future competition (St-Jean, 2012).

In the case of the high-tech incubators, mentors are entrepreneurs with high-tech experiences (McAdam & McAdam, 2008; Patton & Marlow, 2011). The culture of the high-tech industry is a transparent one (Avnimelech et al., 2007; Hisrich & Smilor, 1988). Mentors do not only help protégées stay focused on their business plans and objectives, but also offer industry specific advice on topics such as resources, methods, or knowhow. Mentors may also exchange

contacts and market knowledge with their protégées. They can help their protégées learn what to offer, how to offer and to whom to offer (Patton & Marlow, 2011).

Mentoring is usually executed through active communication (St-Jean, 2011, 2012).

Active communication could be meeting face to face, verbal communication, and text exchange. Active communication in the mentoring process leads to development of the competencies of protégées. Therefore, it is important to discuss the types of competencies and how they are developed.

Competencies

Competency is having the right combination of knowledge, skills, and attributes in order to achieve a set of goals or tasks (McClelland, 1987). Skills and competencies have been used interchangeably. However, it is more appropriate to use the term competencies when describing a specific task while skills are more applicable to a general situation (Chell, 2013). Competencies are multi constructs that include various levels of knowledge and skills besides personal attributes (Hanna, 2007). Knowledge is the description of the subject matter recognized by the individual (Krathwohl, 2002). Skills describes the cognitive processing of knowledge acquired which enables an individual to take action (Polanyi, 1966). Personal attributes are linked to an individual's personality, which adds a uniqueness to an individual's approach when performing common tasks (Bandura, 1999; Chell, 2013; Mitchelmore & Rowley, 2010). Competencies are interactions between the three constructs in order to accomplish a pre-set goal or task.

Competencies are learnable (Argyris & Schön, 1997; Bagheri & Pihie, 2010; Mitchelmore & Rowley, 2010; St-Jean, 2012). Newly acquired knowledge or skills improve individuals' competencies, and they might influence their attributes. A change in environments that disrupt knowledge and skills of entrepreneurs may also improve their competencies

(Sarasvathy, 2001). Competencies of entrepreneurs evolves along with the opportunity development process.

Researchers found no evidence of personal attributes specifically linked to entrepreneurs. There is no entrepreneurial personality (Bipp et al., 2008; Brandstätter, 2011). Furthermore, there is no evidence that entrepreneurs are more risk taking than the general population. What others perceive as risk, entrepreneurs do not see as risk due to their previous knowledge (Karabey, 2012; Krueger & Dickson, 1994). Therefore, since there is probably no specific entrepreneurial personality, entrepreneurs are considered competent due to the quality and quantity of their knowledge and skills.

Knowledge plays an important role in identifying entrepreneurial opportunities (Shane, 2000b). Shane (2000) talked about the importance of knowledge corridors that lead to opportunity recognition. Having specific and specialized experiences, an entrepreneur might be more alert to identify an opportunity (Valliere, 2013). Acquiring new knowledge and experiences is an ongoing daily process for all individuals. Entrepreneurs build on their knowledge with their alertness to recognize opportunities (Gaglio & Katz, 2001; Valliere, 2013). As per table 2, knowledge can be categorized into four levels: factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge (Krathwohl, 2002). Factual knowledge is the recognition of the basic elements of a discipline. Conceptual knowledge is the understanding of the dynamics among the basic elements. Procedural knowledge is the identification of the various methods of acquiring and applying the concepts. Metacognitive knowledge is the awareness of one's knowledge and limitations.

Skills are essential for the successful application of knowledge by entrepreneurs. They need different skills for different tasks throughout the stages of the entrepreneurial process

(Chell, 2013; Jusoh, Ziyae, Asimiran, & Kadir, 2011; Smith, Schallenkamp, & Eichholz, 2006). As described in table 2, skills can be categorized in six cognitive complexity levels which are remember, understand, apply, analyze, evaluate and create (Krathwohl, 2002). They are developed through learning, and mentoring is a common method of learning new skills (St-Jean, 2012). Mentors can play an important role in helping their protégée-entrepreneurs identify what skills are needed based on the upcoming challenges of the entrepreneurial process. Afterward, mentors can also help entrepreneurs select methods to develop required skills (St-Jean & Audet, 2009). Mentors can help their protégée-entrepreneurs identify their skills and their levels of complexity.

Personality traits of individuals have no influence on their decisions to become entrepreneurs (Ciavarella, Buchholtz, Riordan, Gatewood, & Stokes, 2004). The big five personality traits classifies personalities of individuals into five categories: extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Tupes & Christal, 1961). Unlike knowledge and skills, personality traits are fundamental to an individual and are not acquired through education. Consequently, when evaluating competencies of individuals, it is an evaluation of the knowledge and skills of individuals rather than their personalities. Moreover, entrepreneurial competencies do not cover personalities of entrepreneurs because there is no entrepreneurial personality. Entrepreneurial competencies are more about knowledge and skills needed for entrepreneurs to be successful (Chell, 2013).

As presented in table 2, the level of competencies is a combination of the level of knowledge, and the level of skills. For entrepreneurs, it is important to know what competencies are required and at what level to be successful throughout the entrepreneurial process. Researchers have already identified a set of entrepreneurial competencies expected at different

stages of the entrepreneurial process. However, little research has been done on what are the required levels of those competencies and how to measure their levels. Therefore, it is important to initially identify the entrepreneurial competencies and the role they serve in the entrepreneurial process.

Table 2: Revised Bloom's Taxonomy (Krathwohl, 2002)

		Skills					
		Remember	Understand	Apply	Analyze	Evaluate	Create
Knowledge	Factual						
	Conceptual						
	Procedural						
	Metacognitive						

Entrepreneurial Competencies

Throughout the entrepreneurial process of recognizing and developing an opportunity, entrepreneurs acquire several competencies. These competencies are essential for their success in building up sustainable start-ups (Jusoh et al., 2011; Mitchelmore & Rowley, 2010). The entrepreneurial competencies can be categorized into personal competencies, social competencies, and business acumen competencies (Chell, 2013). Each category is a combination of several types of knowledge and skills as shown in Table 3.

Table 3: Categories of entrepreneurial competencies and entrepreneurial process (Chell, 2013)

Entrepreneurial competency	Competency category	Stage of the entrepreneurial process	Research reference
Creativity	Personal	Opportunity recognition	(Ardichvili et al., 2003)
Alertness	Personal	Opportunity recognition	(Gaglio & Katz, 2001; Kirzner, 1997; Shane, 2000b; Valliere, 2013)
Pattern recognition	Personal	Opportunity recognition	(Baron & Ensley, 2006; Rauch & Frese, 2007; Valliere, 2013)
Veridical perception	Personal	Opportunity recognition	(Gaglio, 2004; Gaglio & Katz, 2001; Kirzner, 1979)

Domain knowledge	Personal	Opportunity recognition	(Ardichvili et al., 2003; Shane, 2000b, 2000a)
Resourcefulness	Personal	Opportunity recognition	(Brush, Greene, & Hart, 2001)
Self-efficacy	Personal	Opportunity development	(Bandura, 1999; Krueger & Dickson, 1994; Locke, 1997; Markman, Baron, & Balkin, 2005)
Self-confidence	Personal	Opportunity development	(Chell & Tracey, 2005; Simon & Shrader, 2012)
Judgment	Personal	Opportunity development	(Chell, 2008; Gaglio & Katz, 2001; Rauch & Frese, 2007)
Risk management	Personal	Opportunity development	(Christensen & Bower, 1996; Harper, 2002)
Resilience	Personal	Opportunity development	(Rabow, Berkman, & Kessler, 1983; Shapero, 1975)
Flexibility	Personal	Opportunity development	(McClelland, 1987)
Commitment	Personal	Opportunity development	(Baum, Locke, & Smith, 2001; Locke & Baum, 2007; McClelland, 1987)
Problem solving	Personal	Opportunity development	(Schenkel, Matthews, & Ford, 2009)
Social knowledge	Social	Opportunity recognition	(Ardichvili et al., 2003; Harper, 2002; Shane, 2000b, 2000a)
Persuasiveness	Social	Opportunity development	(Jack & Anderson, 2002; McClelland, 1987; Witt, 1998)
Communication skills	Social	Opportunity development	(Baron & Markman, 2003; Witt, 1998)
Networking	Social	Opportunity development	(Aldrich, Elam, & Reese, 1995; Aldrich & Whetten, 1981; Ardichvili et al., 2003; Baron & Markman, 2003; Birley, 1986; Chell & Baines, 2000; Jack & Anderson, 2002; Johannisson, 1995)
Political astuteness	Social	Opportunity development	(Baron & Markman, 2003; Harper, 2002)

Social learning	Social	Opportunity development	(Argyris & Schön, 1997; Bandura, 1999; Chell, 2008)
Business acumen	Business	Opportunity development	(Arrow, 1974; Rauch & Frese, 2007; Venkataraman, 1997)
Strategic	Business	Opportunity development	(Reynolds & White, 1997)

In the early stages of the opportunity recognition process, entrepreneurs tend to acquire more personal competencies than social and business competencies. Entrepreneurs usually have some level of creativity and innovation, enabling them to envision new opportunities (Ardichvili et al., 2003). They also need a degree of alertness (Gaglio & Katz, 2001; Kirzner, 1997; Shane, 2000b; Valliere, 2013) to recognize opportunities and analyze patterns (Baron & Ensley, 2006; Rauch & Frese, 2007; Valliere, 2013). Entrepreneurs with veridical or clear perceptions are aware of the requirements to exploit opportunities (Gaglio, 2004; Gaglio & Katz, 2001; Kirzner, 1997) while their domain knowledge gives them a competitive advantage (Ardichvili & Cardozo, 2000; Shane, 2000b, 2000a). Furthermore, their resources allow them to create momentum and exploit their opportunities (Brush et al., 2001).

In the early stages of the opportunity development process, entrepreneurs' self-efficacy allows them to influence others and form teams (Bandura, 1999; Krueger & Dickson, 1994; Locke, 1997; Markman et al., 2005), and with the proper levels of self-confidence, they can successfully lead their teams (Chell & Tracey, 2005; Simon & Shrader, 2012). Successful entrepreneurs are able to make good judgments and make appropriate decisions (Chell, 2008; Gaglio & Katz, 2001; Rauch & Frese, 2007). Furthermore, entrepreneurs are expected to manage risk since their environments are uncertain (Christensen & Bower, 1996; Harper, 2002; Sarasvathy, 2001). When challenges emerge, entrepreneurs are expected to be resilient (Rabow et al., 1983; Shapero, 1975) and flexible (McClelland, 1987). In order to grow their start-ups,

entrepreneurs are required to be committed to their goals (Baum et al., 2001; Locke & Baum, 2007; McClelland, 1987). They also further develop their decision making and problem solving skills while their businesses grow (Schenkel et al., 2009). These are the major identified personal competencies in the literature; entrepreneurs might have already developed some before starting the entrepreneurial process.

Entrepreneurs need their social knowledge during the opportunity recognition process. They want to identify market needs, size, and dynamics (Ardichvili et al., 2003; Harper, 2002; Shane, 2000b, 2000a). To further develop their opportunities, entrepreneurs need to convince others of the value of their ideas and to form their start-ups' teams. Therefore, entrepreneurs need to be persuasive (Jack & Anderson, 2002; McClelland, 1987; Witt, 1998) and have strong communication skills (Baron & Markman, 2003; Witt, 1998). In order to establish a sustainable start-up business, entrepreneurs build networks (Aldrich et al., 1995; Aldrich & Whetten, 1981; Ardichvili et al., 2003; Baron & Markman, 2003; Birley, 1986; Chell & Baines, 2000; Jack & Anderson, 2002; Johannisson, 1995) and need to have political acumen (Baron & Markman, 2003; Harper, 2002). Acquiring social learning is an ongoing process for entrepreneurs. They are expected to learn the social norms and take the right action at the right time (Argyris & Schön, 1997; Bandura, 1999; Chell, 2008). Acquiring social competencies is critical for the opportunity development process. Entrepreneurs with low levels of social competencies might not be able to transform their innovative ideas into sustainable start-ups.

Business competencies are classified as managerial rather than entrepreneurial competencies (Busenitz & Barney, 1997). However, business acumen allows entrepreneurs to plan, build, and evaluate their start-ups (Arrow, 1974; Rauch & Frese, 2007). Entrepreneurs are managers, so they are expected to have managerial competencies, such as some knowledge of

leadership, accounting, finance, marketing, operations, and sales. Entrepreneurs also build new business models for their start-ups. Therefore, they are required to have some strategic planning skills. Strategic planning and business modeling are critical requirements for the opportunity development process of a sustainable start-up (Reynolds & White, 1997).

Personal, social, and business competencies are necessary for entrepreneurs to develop sustainable start-ups. However, the entrepreneurs' social competencies have direct implications on their social capital. It is important to discuss social capital and its implications on new entrepreneurs.

Social Capital

Social capital is used to describes a subdivision of an entrepreneur's network that can be beneficial for the entrepreneurial process (Bourdieu, 1983; Davidsson & Honig, 2003; Wise, 2013). It has positive impact on the entrepreneurs' financial successes (Baron & Markman, 2003). Social competencies allow individuals to build, develop, and exploit their social capital. Consequently, entrepreneurs with healthy social capital turn out to have higher levels of social competencies (Chell & Baines, 2000; Wise, 2013).

Social capital is one of the most essential resources for new entrepreneurs. They need social capital to grow their network, such as key customers, suppliers, investors, and consultants (Birley, 1986). Entrepreneurs, rich with social capital, can have better access to services and increase their efficiencies. Social capital is a fundamental requirement for successful start-ups (Chell & Baines, 2000).

Although social capital is not sufficient to guarantee success for new entrepreneurs, it can allow easier access to other resources necessary for success (Baron & Markman, 2003). Entrepreneurs with solid social capital can have access to unique information where they can differentiate their offerings and have competitive advantages. Accessible people, willing to share

useful knowledge, are considered as effective as first-hand knowledge. This allows entrepreneurs to save time, money, and effort (Harper, 2002; Shane, 2000b; Wise, 2013). In addition, social capital can help entrepreneurs get access to investors. Raising capital is a challenge; however, if entrepreneurs have key investors willing to listen and interact, raising capital becomes less challenging (Avnimelech et al., 2007; Davidsson & Honig, 2003; Wise, 2013). Also with access to key customers, entrepreneurs can have early sales, so they can generate cash flow early in the process (Christensen & Bower, 1996). Similarly, entrepreneurs with good suppliers' networks have some industry advantages (Aldrich et al., 1995; Birley, 1986). Therefore, a healthy social capital allows entrepreneurs to grow their start-ups faster.

There is a correlation between an entrepreneur's social capital and an entrepreneur's social competencies (Baron & Markman, 2003; Chell, 2008; Davidsson & Honig, 2003). An entrepreneur with well-established social capital is found to have high levels of social competencies, and an entrepreneur with high levels of social competencies can successfully develop her social capital. Individuals with high levels of social competencies can effectively communicate their ideas and clearly understand remarks from others (Riggio, 1986). Consequently, individuals with low levels of social competencies tend to have challenges expressing their ideas, listening with empathy, and controlling their emotions and behavior (Bandura, 1999; Davis, 1983; Riggio, 1986). On one hand, socially competent entrepreneurs can develop their social capital that helps them grow their star-ups. On the other hand, socially incompetent entrepreneurs may risk losing the impact of their innovative ideas due to lack of communication with stakeholders.

Social competencies, like other competencies, are learnable (Jack & Anderson, 2002; Mitchelmore & Rowley, 2010). They can be developed through formal and informal learning

(Janacsek, Fiser, & Nemeth, 2012). One of the best ways to develop social competencies is through active communication with socially competent individuals (Bandura, 1999; Locke, 1997). New entrepreneurs benefit from developing their social competencies early in the entrepreneurial process. As shown in Table 3, at a certain point in the opportunity development process, entrepreneurs need their social competencies to communicate with stakeholders. For new entrepreneurs to develop their social competencies, they need to be aware of the significance of social competencies and their personal levels of social competencies. Therefore, it is important to discuss the methods available to measure social competencies.

Elements of Social Competency

Social competence is composed of social and emotional intelligence (Riggio, 1986). Researchers in psychology define it as the ability to socially interact with others (Archer, 1980; Semrud-Clikeman, 2007). Emotionally intelligent individuals are capable of reading and analyzing emotional and social signals from others. They also have good control over their emotions (Salovey, 1997). Moreover, socially intelligent individuals have the emotional intelligence and the ability to reveal social and emotional signals (Marlowe, 1986). Social competence is the ability to send, receive, analyze, and control social and emotional signals (Riggio, 1986).

The level of social competence for entrepreneurs is measurable (Riggio, 1986), and social competencies are learnable (St-Jean, 2012). Entrepreneurs need to develop their social competencies in order to grow their start-ups. It is expected that mentors contribute to the development of the entrepreneurs' social competencies (Jack & Anderson, 2002; Ozgen & Baron, 2007; St-Jean, 2011), but it is not known to what extent. Therefore, it is important to discuss how mentors help in developing their protégée-entrepreneurs' social competencies.

Mentoring and Social Competencies

Entrepreneurship studies the factors that help create entrepreneurs and the factors that contribute to their success. The individual is the center of the entrepreneurial process. Consequently, an effective approach for developing the competencies of entrepreneurs can be the learner-focused constructivist educational approach (Huang, 2002).

Adult-learning theories discuss the motivations of adult-learners (Knowles, 1973) and their learning styles (Kolb, 1985). Adult-learners are aware of their needs to acquire new information, and they look for information relevant to their learning objectives (Le Grand, Mondloch, Maurer, & Brent, 2004). They rely on their previous experiences, and they have self-motivation based on self-identified objectives (Knowles, 1973). The adult-learning cycle is a four-phase cycle. They experience a phenomenon, reflect on it, conceptualize it, and test it. The result of testing is a new experience that takes the learner through the cycle again. Learners can enter the learning cycle from any phase. Based on their preferred phase of entry, adults can identify their learning styles (Kolb, 1985). It is most efficient for adults to acquire knowledge through their preferred learning styles; as a result, facilitators must take into consideration the learners' motivations and learning styles when designing learning sessions.

Mentoring at high-tech incubators is a form of adult education where the protégées are at the center of the learning process. According to Piaget, constructivism is a form of education where learners decide what to learn and when to learn it (Wadsworth, 1996). Mentors share insights and suggestions with learners, but the learners have the final say (Huang, 2002). Mentoring has the tendency to be a constructivist approach to learning because mentors cannot teach what protégées do not want to learn, and mentors cannot develop competencies protégées are not interested in developing.

The mentoring relationship is more successful when protégées have self-motivation to develop their competencies, their mentors appreciate their previous experiences (Knowles, 1973), and trust evolves between a mentor and his protégée. Understanding how trust evolves in a mentoring relationship assists in understanding how protégées' social competencies develop as a result of mentoring.

Trust

When engaging in a mentoring relationship, protégées expose their vulnerability to their mentors because protégées share, with their mentors, information about their weaknesses as much as their strengths. When protégées intentionally show their vulnerability, they hope to get feedback from their mentors on how to fix their weaknesses and build upon their strengths. This vulnerability and reward dynamics in a mentoring relationship is based on a trust relationship according to Rousseau (1998). Rousseau defines trust as “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviors of another” (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 395). Thus, there are two elements of trust: vulnerability and reward (McEvily & Tortoriello, 2011).

There are several developed scales to measure trust. In their review, McEvily and Tortoriello (2011) compare the various scales “that measure the extent to which one party places trust in another individual” (p. 26). Their study profiles the most popular scales based on their measuring properties, purpose, and construct validity, and they recommend five notable scales that could be used to measure trust. They all fit three conditions. First, they are developed with the objective to measure trust and not the consequences of trust; second, they reflect the multidimensional nature of trust; third, they are subjected to internal and external validity tests. However, these five scales focus either on willingness to trust or expectations from trust. Currall and Judge (1995) and Gillespie (2003) favor willingness, while McAllister (1995) and

Cummings and Bromiley (1996) favor expectation. Mayer and Davis (1999) measure both elements (McEvily & Tortoriello, 2011). Table 4 lists the five scales and measurement instruments.

Table 4: Noteworthy measures of trust

Authors	Measurement instrument
McAllister (1995)	Managerial Interpersonal Trust (McAllister, 1995)
Currall & Judge (1995)	Boundary Role Persons' Trust (Currall & Judge, 1995)
Cummings & Bromiley (1996)	Organizational Trust Inventory (Cummings & Bromiley, 1996)
Mayer & Davis (1999)	Organizational Trust (Mayer & Davis, 1999)
Gillespie (2003)	Behavioral Trust Inventory (Gillespie, 2003)

Trust, Time, and Social Competencies

In a successful mentoring relationship protégées learn from the statements, actions, questions, and communication styles of their mentors (Goleman, 2000; St-Jean & Audet, 2009). The protégée observes the mentor's actions and reflects on them, or the mentor asks challenging questions for the protégée to reflect on. In addition, knowledge is also exchanged through verbal and written communication. During the early days of successful mentoring relationships, trust between mentors and their protégées develops, permitting transparency in the exchange of information. Higher levels of trust increase the efficacy of communication, allowing for more information to be exchanged with less time and effort. A mentoring relationship that allows for more information exchange between a mentor and his protégée benefits the development of a protégée's social competencies. Therefore, trust between a mentor and his protégée is a fundamental constituent of the mentoring relationship.

Model Development

Putting the previous theories together, a model can be formed to explain the development of social competencies of entrepreneurs in a mentoring relationship at high-tech incubators. This model accounts for the impact of the age of the mentoring relationship, the communication time between a mentor and his protégée, and the level of trust a protégée has towards her mentor. In this section, the evolution of the new model is discussed, and it ends with presenting the hypotheses emerging to test this model.

Key factors influencing the development of the social competencies of protégées in a mentoring relationship are time, communication, and trust. Time and communication between mentors and protégées allows protégées to improve their social competencies by becoming more aware of their deficiencies. Also, time and communication allows protégées to balance the various elements of their social competencies by improving the levels of their weaker elements. Then, trust moderates this relationship and increases its efficacy. The more the protégées trust their mentors, the faster their social competencies develop and the elements of their social competencies balance.

In high-tech incubators, mentoring is a common service. The mentors are often entrepreneurs that were successful in building a start-up business (Mian, 1997; Tamasy, 2007); they have already experienced the entrepreneurial process. Being a successful entrepreneur from the same industry, mentors can support their protégées with specific market knowledge. They have developed their own social capital as a result of building a start-up business (Baron & Markman, 2003), and this social capital might be relevant to the protégées' start-ups. Mentors are considered vital members of their protégées' social capital.

A mentor can help develop his protégée's social capital. This might be a reward that a protégée expects from her mentors. However, a mentor might not be encouraged to introduce his

protégée to influential individuals in his social capital unless his protégée is socially competent. A mentor that introduces socially incompetent protégées to his network could negatively impact his reputation and current social capital. Consequently, a mentor evaluates the levels of social competencies of his protégées before offering them networking support. A socially competent entrepreneur scores high on the Social Skills Inventory (SSI) and has also balanced scores among the six elements of the SSI: emotional expressivity, emotional sensitivity, emotional control, social expressivity, social sensitivity, and social control.

Active communication includes face to face meetings, video and tele conferencing, and text exchange. Since protégées learn from their mentors during active communication because of information exchange during communication sessions, the communication-time spent is expected to indicate development in the levels of the protégées' social competencies. Consequently, it improves the level of the protégées' social competencies leading to the first hypothesis:

H1: More communication-time spent between a mentor and his or her protégée improves the levels of social competencies of the protégée entrepreneur.

The age of the mentoring relationship can reflect its performance. Protégée-entrepreneurs need time to learn from their mentors, reflect on what they learn, practice what they reflect on, and master what they practiced (Matlay, Man, & Yu, 2007). The longer the mentoring relationship implies more incremental information exchange, so the more a mentoring relationship ages the more the social competencies of a protégées develop (St-Jean & Audet, 2012). The elapse-time represents the age of the mentoring relationship. It is expected that a higher elapse-time leads to a higher level of social competencies of the protégée entrepreneur leading to the second hypothesis:

H2: More elapse-time spent between a mentor and his or her protégée improves the levels of social competencies of the protégée entrepreneur.

The efficacy of 25 hours of communication in one week is not the same as 25 hours in 25 weeks. The distribution of the same number of communication-time over a longer period allows protégées to reflect deeper on the content. The communication-time and elapse-time interact together to improve the level of social competencies of the protégée entrepreneur leading to the third hypothesis:

H3: Communication-time and elapse-time interact together to improve the level of social competencies of the protégée entrepreneur.

Protégées learn better from mentors they trust. When protégées trust their mentors, they tend to copy their social behaviour more. Implicit learning becomes as effective as declarative learning. The more a protégée trusts her mentor, the faster the social competencies of protégée entrepreneur develops. Trust moderates the relationship between the predictor variables—communication-time and elapse-time—and the outcome variable: the social competencies of protégée entrepreneurs. Consequently, three hypotheses emerged from the interaction of trust with the first three hypotheses, which allows the formulation of a fourth hypothesis divided into three sub-hypotheses.

The first sub hypothesis captures the role trust plays in moderating communication-time. Protégées that trust their mentors listen more openly to the recommendations of their mentors.

H4a: Trust moderates communication-time, and the more a protégée trusts his or her mentor the faster the level of social competencies of protégée entrepreneurs increase.

The second sub hypothesis captures the role trust plays in moderating elapse-time. Protégées that trust their mentors are more willing to implement the recommendations of their mentors.

H4b: Trust moderates elapse-time, and the more a protégée trusts his or her mentor the faster the level of social competencies of protégée entrepreneurs increase.

The third sub hypothesis captures the role trust plays in moderating interaction of elapse-time and communication-time. Protégées that trust their mentors reflect more effectively on the recommendations of their mentors.

H4c: Trust moderates the combined effect of communication-time and elapse-time, and the more a protégée trusts his or her mentor the faster the level of social competencies of protégée entrepreneurs increase.

Hypotheses H1 to H4c constitute model one in Fig 1.

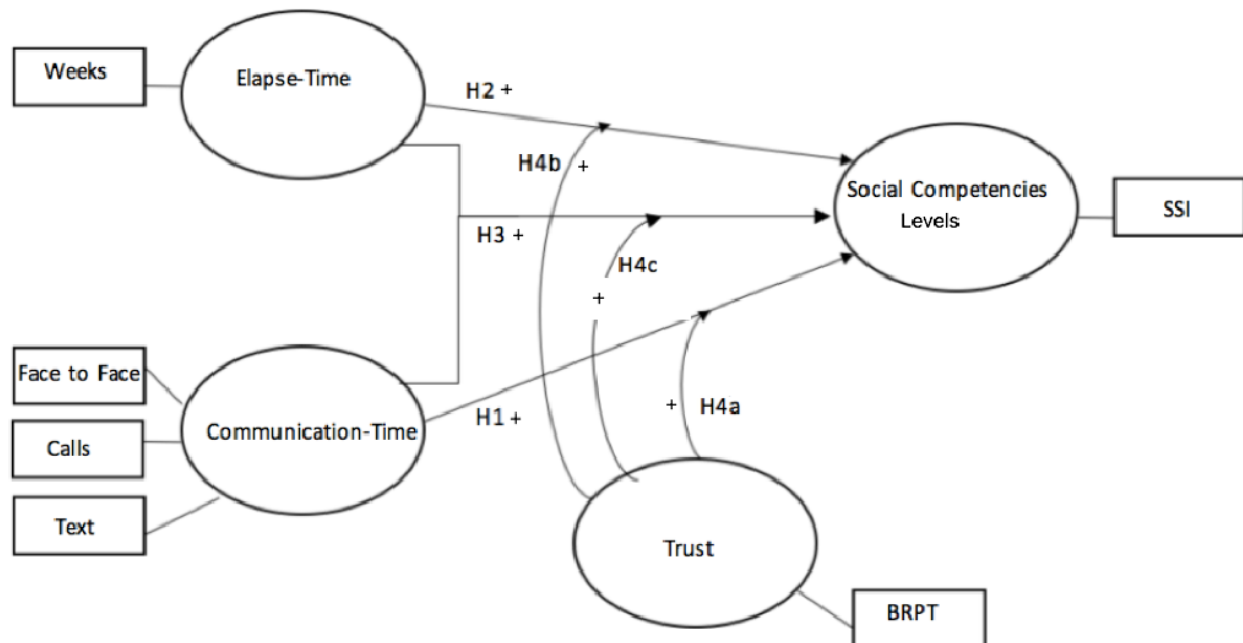


Fig 1: Time, Communication, and Trust Model for Social Competencies Development

A socially competent individual does not only score high on her average of the six elements of social competency, but also have a balanced score among the six elements of social competency (Riggio, 1986). Emotional expressivity, emotional sensitivity, emotional control, social expressivity, social sensitivity, and social control are the six elements of social competency of an individual. Two individuals having the same total social competency level based on the sum of the six elements might not be equally socially competent. While the first one has low standard deviation that implies small variations among the six elements, the second one has high standard deviation that implies big variations among the elements. While the first is considered by Riggio (1986) a well-rounded socially competent individual, the second has major weaknesses and thus less socially competent. An individual with low emotional control, for example, and high emotional expressivity and sensitivity appears to be over sensitive and not able to control his emotions and maybe behaviour. While model one predicts the role of mentors in developing the level of social competency of protégée-entrepreneurs, model two predicts the role of mentors in developing the balance of the elements of social competency.

Asserted with H1, since protégées learn from their mentors during active communication, the communication-time spent is expected to indicate more balance among the six elements of the protégées' social competencies. Consequently, it improves the balance among the elements of the protégées' social competencies leading to a fifth hypothesis:

H5: More communication-time spent between a mentor and his or her protégée improves the balance among the six elements of the social competencies of the protégée entrepreneur.

Asserted with H2 The longer the mentoring relationship implies more information exchange, so the more a mentoring relationship ages the more the six elements of social competencies of a protégées become balanced (St-Jean & Audet, 2012). The elapse-time

represents the age of the mentoring relationship. It is expected that a higher elapse-time leads to a more balanced social competency of the protégée entrepreneur leading to a sixth hypothesis:

H6: More elapse-time spent between a mentor and his or her protégée improves the balance among the six elements of the social competency of the protégée entrepreneur.

Asserted with H3, the elapse-time and communication-time interact together to improve the balance among the elements of the social competency of the protégée entrepreneur leading to a seventh hypothesis:

H7: Communication-time and elapse-time interact together to improve the balance among the six elements of social competency of the protégée entrepreneur.

Asserted with H4, the more a protégée trusts her mentor, the faster her six elements of her social competency become balanced. Consequently, three hypotheses emerged from the interaction of trust with the first three hypotheses, which allows the formulation of an eighth hypothesis divided into three sub-hypotheses: H8a asserted with H4a, H8b, asserted with H4b, and H8c asserted with H4c.

H8a: Trust moderates communication-time, and the more a protégée trusts his or her mentor the faster the six elements of social competency of protégée entrepreneurs become balanced.

H8b: Trust moderates elapse-time, and the more a protégée trusts his or her mentor the faster the six elements of social competency of protégée entrepreneurs become balanced.

H8c: Trust moderates the combined effect of communication-time and elapse-time, and the more a protégée trusts his or her mentor the faster the six elements of social competency of protégée entrepreneurs become balanced.

Hypotheses H5 to H8c constitute model two in Fig 2.

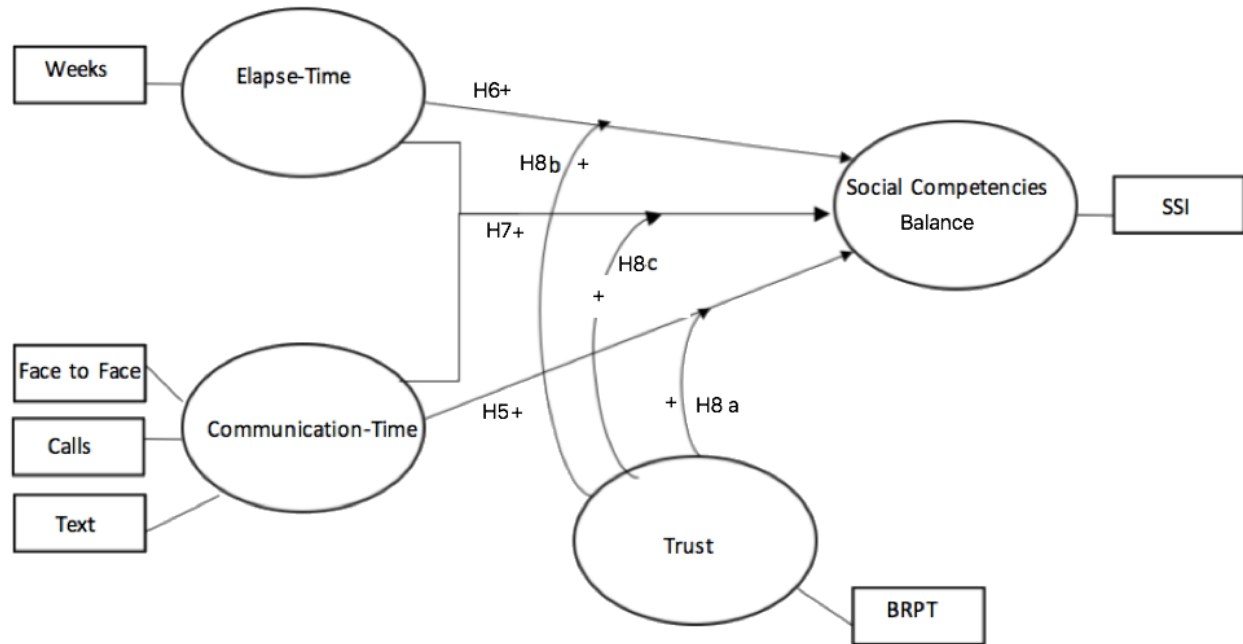


Fig 2: Time, Communication, and Trust Model for Social Competencies Balance

This research investigates the development of social competencies of a mentored protégée-entrepreneur as a function of time in a high-tech incubator environment (Mitchelmore & Rowley, 2010). Protégées learn social skills (St-Jean & Audet, 2012) from their mentors in order to develop their social capital (Chell & Baines, 2000). For entrepreneurs, social capital is necessary for their success in building sustainable start-ups (Baron & Markman, 2003).

Entrepreneurs go through the entrepreneurial process in order to develop their innovations into sustainable start-ups (Cha & Bae, 2010; Chell, 2013; Reynolds & White, 1997), and high-tech incubators are supportive environments for new entrepreneurs (McAdam & McAdam, 2008).

Entrepreneurs contribute to the growth of the global economy (Schumpeter, 1934), and among high-tech entrepreneurs many are considered disruptive (Baumol, 1996). A major challenge of the Austrian school of economics is quantifying entrepreneurial behavior (Kirzner, 1997). The finding could benefit mentors and their protégée-entrepreneurs in high-tech incubators, and the quantitatively analyzed results could allow mentors to allocate time efficiently for developing their protégées' social competencies.

METHODOLOGY

Chapter two provided a literature review that supports a theoretical model and the hypotheses that emerged from this model. This chapter presents the methodology to test the hypotheses of this research. It is divided into several sections. First, the researcher defines the epistemological paradigm and framework of the research. Second, the researcher describes the operationalization of the constructs in the model. Third, the researcher discusses measures used for each variable. Fourth, the researcher explains the sampling of participants in this research. Fifth, the researcher outlines the data collection process.

Paradigm

The “intellectual orientation” (Schram, 2006, p. 40) of a researcher is their perspective on the nature of reality related to their research. Intellectual orientations are also referred to as research paradigms, and according to Kuhn (2012), a research paradigm is composed of three sets of assumptions: ontology, epistemology, and methodology. Ontology is a set of assumptions about the reality of the social world. Epistemology is a set of assumptions about the nature of knowledge. Once the ontology and epistemology are defined, a researcher selects a preferred methodology to implement in their research. The research methodology is shaped by ontology and epistemology (Rallis & Rossman, 2012). Based on their ontological, epistemological, and methodological assumptions, research paradigms can be positioned on an objectivist-interpretivist axis (Burrell & Morgan, 1985). An objectivist paradigm, such as the positivist approach, situates that management sciences have a set of assumptions similar to those of natural sciences (Hughes & Sharrock, 1997). Positivists rely on empirical data and statistical analysis in their quantitative inquiries. On the other hand, an interpretivist paradigm believes that reality is attached to human perception (Crotty, 1998). Interpretivists rely on content and discourse analysis in their qualitative inquiries. Somewhere between the positivist and the interpretivist

paradigm lies the realist paradigm. Like positivists, realists believe in the existence of natural propensities; however, realists believe that natural propensities may remain unactualized due to human perception. Like interpretivists, realists acknowledge the attachment of reality to human perception when exploring and measuring propensities (Ramoglou & Tsang, 2016).

Critical realism theory is a research paradigm used in management studies, and it accounts for both empirical data and social constructs. According to this theory, there are three strata: domain of real, domain of actual, and domain of empirical. The domain of real, which is outside a researcher's knowledge, includes the mechanisms that generate the actual events. The domain of the actual includes observable events generated by mechanisms from the domain of real. Researchers can identify these events in the form of research data. Finally, the domain of empirical includes observable experiences of the events generated from the domain of actual. Researchers analyze data based on their own experiences, which are shaped by psychological and sociological factors (Bhaskar, 2013). Consequently, in critical realism theory epistemology, the theory of knowledge, is different than ontology, the theory of reality. The theory states that although reality exists, researchers cannot completely achieve it; researchers cannot explore all the mechanisms causing an actual event. However, researchers can discover some mechanisms causing the actual observed events (Bhaskar, 1978).

This research is a quantitative deductive study with the purpose of testing the hypotheses of the suggested conceptual model. The model describes the influence of elapse-time, communication-time, and trust in a mentoring relationship on the social competencies gap of a mentor and her protégée-entrepreneur. The critical realism paradigm thus provides this research with a foundation to explore some mechanisms behind the change in the social competencies of a

protégée-entrepreneur. The change in social competencies falls under the domain of actual while communication-time, elapse-time, and trust fall under the domain of real.

Critical realism is a common paradigm in entrepreneurship. Ramoglou and Tsang (2016) use critical realism to argue that entrepreneurial opportunities does not exist independently of the entrepreneur. This argument is consistent with Shane's knowledge corridor concept, which states that the unique experiences of entrepreneurs allow them to see opportunities that are difficult to spot otherwise (Shane, 2000b). Also, Karlsson and Honig (2009) in their criticism of the role of business plans in entrepreneurial education use critical realism as a guide for their qualitative research method. Moreover, Cha and Bae (2010) consider the complex journey of entrepreneurs from their entrepreneurial intent to their opportunity realization falls under critical realism. Finally, Wise (2013) in his PhD dissertation used critical realism as his paradigm. Several entrepreneurship scholars have chosen critical realism as their paradigm, and so does this research.

Operationalization

According to the literature, there are two uncontrolled predictor variables that can influence the outcome variable (the social competencies of an entrepreneur in a mentoring relationship). The first variable is the actual active communication time between a mentor and his protégée (St-Jean, 2011), which is referred to as communication-time. The second variable is the age of a mentoring relationship (Matlay et al., 2007). In this research, it is referred to as elapse-time. In addition to the examined predictor variables (communication-time and elapse-time), the literature identifies trust as a moderator of these two variables (McEvily & Tortoriello, 2011).

Measuring Social Competencies

The short version of the Social Skills Inventory, designed by Riggio (1986), is a 15-item self-report instrument to measure the self-perception of individuals' own social competence level. It measures social competency based on six elements: three nonverbal and three verbal. The nonverbal elements are emotional expressivity, emotional sensitivity, and emotional control, while the verbal elements are social expressivity, social sensitivity, and social control. Individuals with high emotional expressivity scores can transmit clear feelings; thus, they can inspire and motivate others. Individuals with high emotional sensitivity scores can read and decode the feelings of others, making them more empathetic. However, individuals need to control their emotional expressivity and sensitivity to avoid transmitting unwanted feelings and being influenced by negative energy (Riggio, 1986). The combination of the three emotional scales can reflect an individual's emotional intelligence (Murphy, 2002).

Individuals with high scores on social expressivity are expected to have high self-evaluation of their verbal fluency. Individuals with high scores on social sensitivity are more likely to be conscious of the words and actions of others. To avoid extreme situations of over expressiveness without sensitivity and over sensitivity to the words and actions of others, socially competent individuals score high on their social control element. Markman and Baron have used the SSI in quantifying the social competencies of entrepreneurs in their research (Baron & Markman, 2003; Markman & Baron, 2003).

The Social Skills Inventory is a reliable and relevant instrument (Riggio, 1986) to measure the multi-dimensional social competency level of entrepreneurs. As per table 5, the reliability test of the SSI scales ranges from an alpha of 0.75 to 0.88 on a sample of 149 participants who completed the SSI at two-week intervals. SSI scales are also validated against other self-reported and skill-based emotional style and personality scales showing predictable

correlation patterns. Moreover, the short form SSI for a total number of 739 student-participants from a business school has an alpha of 0.76 for the whole inventory as per table 6 below from the Social Skills Inventory Manual.

Table 5: Norms and Reliability Coefficients for the Social Skills Inventory (SSI) (Riggio, 1986, p. 653).

SSI scale	Male subjects (n = 199)		Female subjects (n = 310)		Total sample (N = 509)		t	α (n = 149)	Test-retest r(n = 40)
	M	SD	M	SD	M	SD			
EE	79.8	15.5	83.8	16.7	82.3	16.4	-2.7*	.75	.81
ES	90.1	15.3	100.1	13.6	96.2	15.1	-7.7*	.78	.90
EC	78.0	14.3	72.8	16.3	74.8	15.7	3.7*	.76	.88
SE	84.0	19.4	90.2	19.4	87.8	19.6	-3.5*	.88	.96
SS	88.3	15.9	94.2	16.0	91.9	16.2	-4.1*	.84	.86
SC	86.5	17.3	87.3	18.9	87.0	18.3	-0.5	.87	.92
SM	72.9	14.4	65.4	16.1	68.3	15.9	5.3*	.77	.85
SSI	579.5	65.5	593.8	58.7	588.2	61.8	-2.6*	—	.94

Note. EE = Emotional Expressivity. ES = Emotional Sensitivity. EC = Emotional Control. SE = Social Expressivity. SS = Social Sensitivity. SC = Social Control. SM = Social Manipulation.

* $p < .05$.

Table 6: Brief SSI Descriptive Statistics and Cut-off Scores by Gender

Business School Student Sample (N = 739)						
Males (N = 439)						
Scale	M	SD	α	SEM	High Cutoff	Low Cutoff
Brief – EE	16.03	3.17	.46	.15	19.20	12.86
Brief – ES	17.22	3.23	.60	.15	20.44	13.99
Brief – EC	18.38	3.29	.64	.16	21.67	15.09
Brief – SE	16.91	4.61	.89	.22	21.52	12.30
Brief – SS	15.19	3.73	.74	.18	18.92	11.46
Brief – SC	18.86	3.37	.71	.16	22.23	15.50
Brief E Total	51.48	5.58	.42	.27	57.05	45.90
Brief S Total	50.97	8.19	.81	.39	59.16	42.79
Brief Total Ex	33.08	6.38	.77	.31	39.46	26.70
Brief Total Se	32.48	5.43	.70	.26	37.91	27.05
Brief Total Co	37.28	5.25	.71	.25	42.53	32.03
Brief SSI Overall	102.45	11.78	.78	.56	114.23	90.67
Brief EI	46.92	1.15	-	.06	48.07	45.77

Scale	Females (N = 300)					
	M	SD	α	SEM	High Cutoff	Low Cutoff
Brief – EE	17.16	2.71	.33	.16	19.88	14.45
Brief – ES	16.84	3.30	.63	.19	20.14	13.54
Brief – EC	16.99	3.66	.70	.21	20.66	13.33
Brief – SE	17.59	4.79	.90	.28	22.39	12.80
Brief – SS	16.10	3.95	.78	.23	20.05	12.15
Brief – SC	18.22	3.69	.68	.21	21.91	14.53
Brief E Total	50.82	6.03	.52	.35	56.86	44.79
Brief S Total	51.91	7.96	.77	.46	59.87	43.96
Brief Total Ex	34.79	6.16	.77	.36	40.95	28.63
Brief Total Se	33.06	5.23	.66	.30	38.29	27.83
Brief Total Co	35.25	5.66	.73	.33	40.91	29.59
Brief SSI Overall	102.74	11.53	.76	.67	114.27	91.20
Brief EI	46.96	1.26	-	.07	48.22	45.70

The Social Skills Inventory measures the level of social competencies which is the sum of all six elements equally weighted on a scale of 15 to 450:

$$LSC = EE + ES + EC + SE + SS + SC$$

(LSC = Level of Social Competencies; EE = emotional expressivity; ES = emotional sensitivity, EC = emotional control; SE = social expressivity; SS = social sensitivity; SC = social control)

The Social Skills Inventory also measures the balance among the levels of its six elements. The balance of the social competencies reflects how well rounded is the individual among the six dimensions. The Balances Social Competency (BSC) is a number on a scale of one to 50 with 50 being perfectly balanced.

$$BSC = 50 - \{[(LSC/6 - EE)^2 + (LSC/6 - ES)^2 + (LSC/6 - EC)^2 + (LSC/6 - SE)^2 + (LSC/6 - SS)^2 + (LSC/6 - SC)^2]/6\}^{1/2}$$

Measuring Communication-Time and Elapse-Time

For this study, communication-time and elapse-time are reported by protégée-entrepreneurs. Communication-time represents time spent in actual communication between a mentor and his protégée-entrepreneur. Communication can happen in three forms: face to face

meetings, audio or video conferencing, and email or any text exchange. Communication-time is the total sum in hours invested in all three forms of communication. In contrast, elapse-time represents the age of a mentoring relationship in weeks. However, it is expected that the return of elapse-time and communication time diminishes with more of each. With elapse-time and communication-time in a mentoring relationship the social competencies of protégée entrepreneurs develop in a diminishing pattern because the better the levels of social competencies get, the less the opportunities for development of these competencies get. Similarly, with the balance of the social competencies of protégée entrepreneurs, the social competencies of protégée entrepreneurs balance out in a diminishing pattern because the more balanced the social competencies are, the less room to further balance these competencies.

Measuring Trust

The Boundary Role Persons Trust Instrument (BRPTI) is a 20-item self-reported instrument that measures trust focusing on the intention to participate in a trusting relationship (Currall & Judge, 1995). Currall and Judge (1995) design the instrument based on their definition of trust as “an individual’s behavioral reliance on another person under a condition of risk” (p. 153). This definition is aligned with Rousseau’s (1998) description of trust as a balance between vulnerability and reward. Consequently, the BRPTI illustrates this balance in its four scales: communication, informal agreement, surveillance, and task coordination (Currall & Judge, 1995).

The BRPTI has been modified to better serve the purpose of this research. The original form of BRPTI measures trust in both directions between a manager and her employee. While this feature of the BRPTI is valuable for a reciprocal manager-employee relationship, it is not necessary for this research. This study examines how a protégée’s trust for her mentor moderates the effect of time on the development of her social competencies. Consequently, three of the four

scales are relevant to this research and they are communication, informal agreement, and surveillance. The task coordination scale is irrelevant because its items target situations related to working on common projects. While managers and employees work together on common projects, mentors support their protégées who are working on their own projects.

The items of the relevant scales are also modified as per table 7. In the original BRPTI, 15 items are used to measure the three scales: communication, informal agreement, and surveillance. However, only ten items are used to measure trust in this research. All five items used to measure the communication scale are relevant to this research. Only two items used to measure the informal agreement scale are relevant to this research while the other three are not because they are related to corporate situations typical to a relationship between a manager and his employee. Finally, only three items of the surveillance scale are relevant to this research while the other two are related to corporate situations. The modified BRPTI used in this research has ten items that measure the three scales of trust: communication, informal agreement and surveillance. Consequently, the modified BRPTI has been revalidated using confirmatory factor analysis before using it to quantify trust in testing the hypotheses in this research.

Table 7: BPRTI Modifications

Scale	Item in BRPTI	Item as Used in this research
Communication	Think carefully before telling the (counterpart BRP) my opinions.	I think carefully before telling my mentor my opinions.
Communication	Give the (counterpart BRP) all known and relevant information about important issues even if there is a possibility that it might jeopardize the (respondent's organization).	I give my mentor all known and relevant information about important issues even if it is critical information about my start-up.
Communication	Give the (counterpart BRP) all known and relevant information about important issues even if there is a possibility that it might	I give my mentor all known and relevant information about important issues even if it might jeopardize my position as his/her protégée.

	jeopardize my job as the (respondent's job).	
Communication	Minimize the information I give to the (counterpart BRP).	I minimize the information I give to my mentor.
Communication	Deliberately withhold some information when communicating with the (counterpart BRP).	I deliberately withhold some information when communicating with my mentor.
Informal Agreement	Enter into an agreement with the (counterpart BRP) even if his/her future obligations concerning the agreement are not explicitly stated.	I agree with my mentor just because he said so.
Informal Agreement	Enter into an agreement with the (counterpart BRP) even if I think other people might try to persuade him/her to break it.	Irrelevant for a mentor-protégée relationship
Informal Agreement	Enter into an agreement with the (counterpart BRP) even if it is unclear whether he/she would suffer any negative consequences for breaking it.	I agree with my mentor even though he/she would not suffer any negative consequences.
Informal Agreement	Decline the (counterpart BRP's) offer to enter into an unwritten agreement.	Irrelevant for a mentor-protégée relationship
Informal Agreement	Suggest that the (counterpart BRP) and I enter into an unwritten agreement.	Irrelevant for a mentor-protégée relationship
Surveillance	Watch the (counterpart BRP) attentively in order to make sure he/she doesn't do something detrimental to the (respondent's organization).	I watch my mentor carefully in order to make sure he/she doesn't do something unfavorable to my start-up.
Surveillance	Keep surveillance over the (counterpart BRP) (i.e. 'look over his/her shoulder') after asking him/her to do something.	Irrelevant for a mentor-protégée relationship

Surveillance	Feel confident after asking the (counterpart BRP) to do something.	I feel confident asking my mentor to do something for me.
Surveillance	Check with other people about the activities of the (counterpart BRP) to make sure he/she is not trying to 'get away' with something.	I check with other people about the suggestions of my mentor to make sure he/she is giving me a good advice.
Surveillance	In situations other than contract negotiations, check records to verify facts stated by the (counterpart BRP).	Irrelevant for a mentor-protégée relationship

Therefore, this research explores the relationship between the predictor variables (communication-time and elapse-time) and outcome variable (the social competencies of protégée-entrepreneurs) moderated by trust, while keeping the industry of participants and their entrepreneurial environment fixed (high-tech incubators in Southwest Ontario).

Research Design and Methods

The survey of this research, in appendix A, targeted protégée-entrepreneurs at high-tech incubators in Southwest Ontario. The purpose of this survey was to measure the predictor variables, trust, and the social competencies levels and balance of participating entrepreneurs. This survey asked participants to identify their mentors. Then, the survey had questions on the age of the mentoring relationship of participants (elapse-time). It also included several questions on various forms of communication between participants and their mentors, and the time spent on each form of communication. These questions allowed for the calculation of the communication-time variable.

The survey of this research included also the 15-item short-form Social Skills inventory to measure the social competencies levels and balance of participants, and the ten-item modified BRPTI to measure the levels of trust between participants and their mentors.

The survey was prepared by the researcher, reviewed by the supervisor, and pilot tested. More than ten individuals including professors, graduate students, and technology professionals reviewed and commented on the survey questions and format. The questions were modified in both format and formation based on the reviewers' comments in order to reduce ambiguity.

Sampling

Entrepreneurs at high-tech incubators in south west Ontario were approached to participate in a 15-minute survey. Participation was limited to incubated entrepreneurs with mentors, and in the case of having more than one mentor, entrepreneurs were asked to choose the one they considered most influential. Participants were recruited from University based incubators at Ryerson University. A cluster of more than ten incubators with more than 300 entrepreneurs working on more than 120 start-ups in various stages of the entrepreneurial process.

The researcher targeted 99 participants and used their replies as data to analyze the relationship among four variables. The acceptable number of participants for a three independent variable regression analysis is 74 ($N \geq 50 + 8 * m$; m =number of independent variables) (Green, 1991). Furthermore, replies of 81 participants were used to validate the modified ten-item BRP Trust Inventory with a ratio of more than 8 participants per item. The accepted minimum ratio of participants to items is between 5:1 (Robert C. MacCallum, Keith F. Widaman, Shaobo Zhang, & Sehee Hong, 1999).

The researcher targeted incubated entrepreneurs at Ryerson incubators known as zones: Digital Media Zone, Fashion Zone, Transmedia Zone, Biomedical Zone, Legal Innovation Zone,

Social Venture Zone, Center of Urban Energy, Science Discovery Zone, Food Innovation Hub, and Music Den. The incubated entrepreneurs from Ryerson zones were all working on developing new innovations that includes a technology component. Although the newly developed innovations targeted different industries, entrepreneurs at Ryerson zones that were listed earlier were identified as technology entrepreneurs working at university based high-tech incubators in Toronto. This sample frame of entrepreneurs satisfies the conditions previously set in the model development that fixes the industry, environment, and culture variables in this study.

Employees of start-ups in the targeted incubators were excluded from the sampling frame, as well as mentors, consultants, and employees of the zones. Only founders or cofounders are considered as entrepreneurs and thus, included in the sampling frame of participants. The sampling unit was the individual entrepreneurs regardless of age, gender, and start-up of the entrepreneur. Moreover, if one start-up had more than one founder, every founder was considered and independent entrepreneur and was asked every founder to participate independently in the survey.

Recruitment of entrepreneurs for online participation in the survey of this research started indirectly through the management team of the zones, but the participation did not exceed six participants in two months. To improve participation, the researcher was granted permission to recruit participants in person at the zones. Participation improved dramatically, and in one month the researcher recruited 99 participants divided on the zones as shown in Table 8.

Table 8: Number of Recruits per Incubator

Incubator	Number of Participants
Biomedical Zone	9
Centre for Urban Energy	1
DMZ	46

Fashion zone	10
Food Innovation Hub	2
Legal Innovation Zone	9
Music Den	4
Science Discovery Zone	2
Social Venture Zone	4
Transmedia Zone	12
Total	99

Data Collection

The researcher recruited participants from incubators affiliated with Ryerson University. All ten incubators were located within the same geographical area of downtown Toronto. Recruitment was facilitated by faculty members at Ted Rogers School of Management, where they introduced the researcher to the managers of each incubator. The researcher booked time to access each facility, and he was approaching the members with requests to complete his survey in return for a \$5 gift card from Starbucks. The recruits were given the option either to complete the survey online or on paper. In the case of paper surveys, the researcher entered them in Qualtrics, the survey software, later the same day. Furthermore, the manager of each incubator announced on their internal network to all members the research topic and a link to the online survey.

The 99 participants represented more than 20% of all entrepreneurs located at the relevant incubators. Recruitment occurred within a time frame of four weeks mostly by personally approaching resident entrepreneurs, and asking them to complete the ten-minute survey for this research. Only one approached recruit refused to complete the survey while all the rest who were asked to participate willingly participated, and in return, they were given the \$5 gift card for their time. Participants who completed the survey online were emailed the \$5 gift card from Starbucks. The non-respondents were incubated entrepreneurs that were not on the

facility on recruitment day. I had no reason to expect any significant difference between the sample of participants and the population of potential participants. However, there was a probability that non-respondents were busier at the time of recruitment, and that they could have had more successful start-ups at that time.

The survey had 12 mandatory questions and asked for information on the age of the mentoring relationship and the various forms of communication. Question 11 of the survey was the Social Skills Inventory, and Question 12 was the modified BRP Trust Inventory (Appendix A). Participant took no more than 15 minutes to complete the survey on paper or online as per Qualtrics records. After data collection, the reports were exported from Qualtrics to Excel. The data was checked and cleaned in Excel. There was no missing data because the questions were mandatory. From excel, the data was exported to SPSS and statistically analysed in SPSS.

RESULTS

Trust Scale Validation

The ten-item modified BRP Trust Inventory has been validated using Principal Component Analysis (PCA) in SPSS. The objective of this validation is to confirm that the items of the inventory measure the three scales: communication, informal agreement, and surveillance, as predicted with five items to measure communication, two items to measure informal agreement, and three items to measure surveillance. The outcome of the PCA analysis suggests a further modification of the BRP Trust Inventory. The final version of the modified BRP Trust Inventory has seven items with three measuring communication, two measuring informal agreement, and two measuring surveillance.

After surveying 84 participants, the researcher decided to run confirmatory PCA to validate the BRP Trust Inventory. The required minimum number of participants was 50 for a 10-item inventory with a ratio of five participants per item. Although the recommended ratio is

10 participants per item (Nunnally, 1978), smaller sample sizes, such as four participants per item, were acceptable in this case due to high communalities (correlation >0.6) (MacCallum et al., 1999; Tinsley & Kass, 1979). The final number of participants was 81 after cleaning the data (n=81) because three participants did not identify their mentors. The final version of the seven-item BRP Trust Inventory was confirmed after four PCA analyses in SPSS.

The first analysis was for the initial version of the 10-item modified BRPTI. Using the principal component analysis in SPSS, the 10-item inventory was analysed to confirm the number of scales previously set and group the items relevant to each scale. The extraction was based on an Eigen value greater than one, and the selected rotation was the orthogonal Varimax. As a result of the analysis, the determinant was 0.097 (table 9), the KMO was 0.544, and the Bartlett's test of sphericity was less than 0.001 significance (table 10). Four components emerged that explain 66.813% of the data (table 11). However, in the rotated component matrix of table 12, item10 had 0.524 correlation with component one and 0.553 correlation with component two. The researcher decided to rerun the analysis after eliminating item10 because of this discrepancy.

Table 9: Correlation Matrix I

		CD1	SD1	IA1	CD2	CD3	SD2	IA2	CD4	SD3	CD5
Correlation	CD1	1.000	.207	.150	-.144	-.028	-.063	-.112	.203	.089	.137
	SD1	.207	1.000	.025	.027	-.076	.064	-.073	.109	.292	.107
	IA1	.150	.025	1.000	-.052	-.125	-.012	.382	-.067	.115	-.096
	CD2	-.144	.027	-.052	1.000	.689	.332	.051	.437	-.218	.212
	CD3	-.028	-.076	-.125	.689	1.000	.171	.136	.427	-.357	.220
	SD2	-.063	.064	-.012	.332	.171	1.000	.190	.177	-.092	.112
	IA2	-.112	-.073	.382	.051	.136	.190	1.000	-.067	.030	-.026
	CD4	.203	.109	-.067	.437	.427	.177	-.067	1.000	-.078	.534
	SD3	.089	.292	.115	-.218	-.357	-.092	.030	-.078	1.000	.260
	CD5	.137	.107	-.096	.212	.220	.112	-.026	.534	.260	1.000
Sig. (1-tailed)	CD1		.032	.091	.100	.401	.288	.160	.035	.215	.111
	SD1		.032	.414	.404	.249	.285	.259	.167	.004	.170
	IA1		.091	.414	.321	.134	.458	.000	.277	.154	.198
	CD2		.100	.404	.321	.000	.001	.326	.000	.026	.029
	CD3		.401	.249	.134	.000	.063	.114	.000	.001	.024
	SD2		.288	.285	.458	.001	.063	.045	.057	.207	.160
	IA2		.160	.259	.000	.326	.114	.045	.275	.396	.409
	CD4		.035	.167	.277	.000	.000	.057	.275	.244	.000
	SD3		.215	.004	.154	.026	.001	.207	.396	.244	.010
	CD5		.111	.170	.198	.029	.024	.160	.409	.000	.010

a. Determinant = .097

Table 10: KMO and Bartlett's Test I

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.544
Bartlett's Test of Sphericity	Approx. Chi-Square
	176.761
	df
	45
	Sig.
	.000

Table 11: Total Variance Explained I

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.474	24.736	24.736	2.474	24.736	24.736	2.465
2	1.723	17.228	41.964	1.723	17.228	41.964	1.593
3	1.442	14.417	56.381	1.442	14.417	56.381	1.442
4	1.043	10.432	66.813	1.043	10.432	66.813	1.292
5	.927	9.266	76.079				
6	.768	7.679	83.758				
7	.567	5.675	89.433				
8	.489	4.891	94.324				
9	.345	3.451	97.774				
10	.223	2.226	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 12: Rotated Component Matrix I

	Component			
	1	2	3	4
CD1	.085	.184	.089	.842
SD1	.043	.637	-.011	.097
IA1	-.114	.025	.822	.272
CD2	.807	-.106	.034	-.241
CD3	.813	-.298	.024	-.045
SD2	.410	.163	.232	-.467
IA2	.077	-.026	.813	-.249
CD4	.771	.211	-.103	.272
SD3	-.287	.805	.082	-.039
CD5	.524	.553	-.127	.113

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

The second analysis was for the nine-item modified BRPTI after removing item 10. With the same setting as the first analysis except for one less item, the results showed a determinant of 0.162 (table 13), KMO of 0.537, and the Bartlett's test of sphericity was less than 0.001 significance (table 14). Four components emerged that explain 69.868% of the data (table 15). However, in the rotated component matrix of table 16, item 6 had 0.487 correlation with component one and -0.427 correlation with component four. The researcher decided to rerun the analysis after eliminating item 6 because of this discrepancy.

Table 13: Correlation Matrix II

		CD1	SD1	IA1	CD2	CD3	SD2	IA2	CD4	SD3
Correlation	CD1	1.000	.207	.150	-.144	-.028	-.063	-.112	.203	.089
	SD1	.207	1.000	.025	.027	-.076	.064	-.073	.109	.292
	IA1	.150	.025	1.000	-.052	-.125	-.012	.382	-.067	.115
	CD2	-.144	.027	-.052	1.000	.689	.332	.051	.437	-.218
	CD3	-.028	-.076	-.125	.689	1.000	.171	.136	.427	-.357
	SD2	-.063	.064	-.012	.332	.171	1.000	.190	.177	-.092
	IA2	-.112	-.073	.382	.051	.136	.190	1.000	-.067	.030
	CD4	.203	.109	-.067	.437	.427	.177	-.067	1.000	-.078
	SD3	.089	.292	.115	-.218	-.357	-.092	.030	-.078	1.000
Sig. (1-tailed)	CD1		.032	.091	.100	.401	.288	.160	.035	.215
	SD1	.032		.414	.404	.249	.285	.259	.167	.004
	IA1	.091	.414		.321	.134	.458	.000	.277	.154
	CD2	.100	.404	.321		.000	.001	.326	.000	.026
	CD3	.401	.249	.134	.000		.063	.114	.000	.001
	SD2	.288	.285	.458	.001	.063		.045	.057	.207
	IA2	.160	.259	.000	.326	.114	.045		.275	.396
	CD4	.035	.167	.277	.000	.000	.057	.275		.244
	SD3	.215	.004	.154	.026	.001	.207	.396	.244	

a. Determinant = .162

Table 14: KMO and Bartlett's Test II

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.537
Bartlett's Test of Sphericity	Approx. Chi-Square
	138.589
	df
	36
	Sig.
	.000

Table 15: Total Variance Explained II

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.337	25.968	25.968	2.337	25.968	25.968	2.273	25.256	25.256
2	1.476	16.404	42.372	1.476	16.404	42.372	1.424	15.822	41.078
3	1.439	15.989	58.361	1.439	15.989	58.361	1.372	15.249	56.327
4	1.036	11.507	69.868	1.036	11.507	69.868	1.219	13.541	69.868
5	.793	8.813	78.681						
6	.650	7.225	85.906						
7	.564	6.270	92.176						
8	.477	5.302	97.478						
9	.227	2.522	100.000						

Extraction Method: Principal Component Analysis.

Table 16: Rotated Component Matrix II

	Component			
	1	2	3	4
CD1	.047	.062	.186	.855
SD1	.123	-.082	.800	.150
IA1	-.111	.820	.041	.268
CD2	.851	.005	-.053	-.172
CD3	.817	.012	-.299	.005
SD2	.487	.195	.277	-.427
IA2	.092	.827	-.035	-.239
CD4	.713	-.106	.104	.352
SD3	-.312	.093	.718	.007

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The third analysis was for the eight-item modified BRPTI after removing items 10 and 6.

With the same setting as the first analysis except for two less items, the results showed a determinant of 0.196 (table 17), KMO of 0.547, and the Bartlett's test of sphericity was less than 0.001 significance (table 18). Three components emerged that explain 63.500% of the data (table 19). However, in the rotated component matrix of table 20, item 1, which was supposed to be a communication item, had 0.76 correlation with component two, which is the surveillance

component. The researcher decided to rerun the analysis after eliminating item 1 because it correlated with a different set of items than what it was initially developed for.

Table 17: Correlation Matrix III

		CD1	SD1	IA1	CD2	CD3	IA2	CD4	SD3
Correlation	CD1	1.000	.207	.150	-.144	-.028	-.112	.203	.089
	SD1	.207	1.000	.025	.027	-.076	-.073	.109	.292
	IA1	.150	.025	1.000	-.052	-.125	.382	-.067	.115
	CD2	-.144	.027	-.052	1.000	.689	.051	.437	-.218
	CD3	-.028	-.076	-.125	.689	1.000	.136	.427	-.357
	IA2	-.112	-.073	.382	.051	.136	1.000	-.067	.030
	CD4	.203	.109	-.067	.437	.427	-.067	1.000	-.078
	SD3	.089	.292	.115	-.218	-.357	.030	-.078	1.000
Sig. (1-tailed)	CD1		.032	.091	.100	.401	.160	.035	.215
	SD1			.414	.404	.249	.259	.167	.004
	IA1				.321	.134	.000	.277	.154
	CD2					.000	.326	.000	.026
	CD3						.114	.000	.001
	IA2							.275	.396
	CD4								.244
	SD3								

a. Determinant = .196

Table 18: KMO and Bartlett's Test III

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.547
Bartlett's Test of Sphericity	Approx. Chi-Square
	124.583
	df
	28
	Sig.
	.000

Table 19: Total Variance Explained III

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.213	27.657	27.657	2.213	27.657	27.657	2.168	27.095	27.095
2	1.473	18.406	46.063	1.473	18.406	46.063	1.509	18.866	45.961
3	1.395	17.437	63.500	1.395	17.437	63.500	1.403	17.539	63.500
4	.966	12.070	75.570						
5	.656	8.204	83.774						
6	.567	7.091	90.865						
7	.481	6.015	96.881						
8	.250	3.119	100.000						

Extraction Method: Principal Component Analysis.

Table 20: Rotated Component Matrix III

	Component		
	1	2	3
CD1	.048	.674	.000
SD1	.033	.729	-.046
IA1	-.097	.190	.812
CD2	.849	-.087	.037
CD3	.875	-.172	.038
IA2	.081	-.168	.842
CD4	.717	.348	-.106
SD3	-.384	.549	.140

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

The fourth analysis was for the seven-item modified BRPTI after removing items 10, 1, and 6. The extraction was based on an Eigen value greater than one, and the selected rotation was the orthogonal Varimax. The results showed a determinant of 0.244 in table 21, KMO of 0.597, and the Bartlett's test of sphericity was less than 0.001 significance in table 22. Three components emerged that explains 69.898% of the data in table 23. In the rotated component matrix of table 24, items 4, 5, and 8 formed the communication component with a correlation of 0.861, 0.848, and 0.736, respectively; items 3 and 7 formed the informal agreement component with a correlation of 0.808 and 0.845, respectively; finally, items 2 and 9 formed the surveillance component with a correlation of 0.821 and 0.741, respectively. These results were consistent with the predictions.

Table 21: Correlation Matrix IV

		SD1	IA1	CD2	CD3	IA2	CD4	SD3
Correlation	SD1	1.000	.025	.027	-.076	-.073	.109	.292
	IA1	.025	1.000	-.052	-.125	.382	-.067	.115
	CD2	.027	-.052	1.000	.689	.051	.437	-.218
	CD3	-.076	-.125	.689	1.000	.136	.427	-.357
	IA2	-.073	.382	.051	.136	1.000	-.067	.030
	CD4	.109	-.067	.437	.427	-.067	1.000	-.078
	SD3	.292	.115	-.218	-.357	.030	-.078	1.000
Sig. (1-tailed)	SD1		.414	.404	.249	.259	.167	.004
	IA1	.414		.321	.134	.000	.277	.154
	CD2	.404	.321		.000	.326	.000	.026
	CD3	.249	.134	.000		.114	.000	.001
	IA2	.259	.000	.326	.114		.275	.396
	CD4	.167	.277	.000	.000	.275		.244
	SD3	.004	.154	.026	.001	.396	.244	

a. Determinant = .244

Table 22: KMO and Bartlett's Test IV

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.597
Bartlett's Test of Sphericity	Approx. Chi-Square
	108.397
	df
	21
	Sig.
	.000

Table 23: Total Variance Explained IV

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.207	31.531	31.531	2.207	31.531	31.531	2.115	30.221	30.221
2	1.396	19.942	51.473	1.396	19.942	51.473	1.402	20.032	50.253
3	1.290	18.425	69.898	1.290	18.425	69.898	1.375	19.645	69.898
4	.664	9.489	79.387						
5	.649	9.271	88.658						
6	.520	7.431	96.089						
7	.274	3.911	100.000						

Extraction Method: Principal Component Analysis.

Table 24: Rotated Component Matrix IV

	Component		
	1	2	3
SD1	.147	-.068	.821
IA1	-.097	.808	.135
CD2	.861	.038	-.079
CD3	.848	.045	-.279
IA2	.076	.845	-.101
CD4	.736	-.112	.196
SD3	-.277	.120	.741

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

The seven-item modified and validated BRP Trust Inventory has been used to measure trust when testing the hypotheses. The three scales have been given equal weights when calculating the total trust value, and the total trust value ranges on a scale from 1 to 50. Calculating the total trust is divided into four steps. Step one calculates the total communication value on a scale of 50. Step two calculates the total information agreement value on a scale of 50. Step three calculates the total surveillance value on a scale of 50. The final step computes the average of the three scales per participant.

Communication Value $CV = 50 \times [\text{Item4} + \text{Item5} + \text{Inverse}(\text{Item8})]/21$ (21 is the maximum of the three items where each item is out of seven)

Informal Agreement Value $IA = 50 \times [\text{Item3} + \text{Item7}]/14$ (14 is the maximum of the two items where each item is out of seven)

Surveillance Value $SV = 50 \times [\text{Inverse}(\text{Item2}) + \text{Inverse}(\text{Item9})]/14$ (14 is the maximum of the two items where each item is out of seven)

Total Trust = $(CV + IA + SV)/3$ (on a scale of one to 50)

Testing the Models

Having one model with the Level of Social Competencies (LSC) as its outcome variable and the second model with the Balance of Social Competencies (BSC) as its outcome variable, the researcher tested each model twice using linear hierarchical regression. The first time was without trust as a moderator, and the second time was with trust as a moderator. Each hierarchical regression analyses had two levels. The first level had elapse-time and communication-time as predictor variables, while in the second level the interaction between elapse-time and communication-time was added as a third variable. The total number of participants was 99 ($n=99$) with no missing data in their surveys. A prerequisite for running was to confirm that the variables have normal distribution functions.

Testing for Normality of the Variables

Using SPSS descriptive statistics and choosing normality plots with tests, the researcher analyzed the five variables involved with both models. The predictor variables were elapse-time and communication-time. The moderator was trust. The outcome variable for the first model was the Level of Social Competencies, and the outcome variable for the second model was the Balance of Social Competencies.

Because the effect of elapse-time and communication-time on the level and balance of social competencies is expected to diminish over mentoring time, the researcher decided to transform elapse-time and communication-time into log functions. The new predictor variables became LogET and LogCT where $\text{LogET} = \text{Log}(\text{elapse-time in days})$ and $\text{LogCT} = \text{log}(\text{communication-time in minutes per week})$. When tested for normality, both log functions came to be normal with their significance of Shapiro-Wilk test >0.05 , precisely 0.229 significance for LogET and 0.104 significance for LogCT as shown in table 25. The predictor variables that were used to test the model in hierarchical regression analysis were LogET and LogCT.

Table 25: Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Elapse-Time	.284	99	.000	.516	99	.000
Communication-Time	.291	99	.000	.481	99	.000
Level of SC	.057	99	.200*	.988	99	.495
Balance of SC	.072	99	.200*	.976	99	.073
Trust Level	.079	99	.129	.984	99	.279
LogET	.072	99	.200*	.983	99	.229
LogCT	.062	99	.200*	.978	99	.104

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Hierarchical Regression Analysis for Level of Social Competency

Hierarchical regression analysis was used to test H1, H2 and H3 because the communication-time, the predictor variables of H1, and the elapse-time, the predictor variable of H2 were supported by previous research while the interaction of both communication-time and elapse-time was based on the previously elaborated argument in the model building section. The outcome variable was the level of social competencies (LSC), and the predictor variables were

LogCT, the logarithmic transformation of communication-time, and LogET, the logarithmic transformation function of elapse-time. The method of regression was forced entry because the regression analysis was testing a theory (Studenmund, 2016). After specifying the first block in the hierarchy, the logarithmic function of the interaction of both elapse-time and communication-time $\text{Log}(\text{ET} \times \text{CT})$ was added to the independent variables in block two while keeping a forced entry regression method.

After the test was run, the results provided no evidence that the elapse-time of a mentoring relationship and the communication-time between the mentor and her protégée were successful in predicting the level of social competencies of the protégée. According to the table 26 the variables were not highly correlated which implies no evidence for multicollinearity. In the Table 27, the Model Summary, R squared for both models were low 0.09 and 0.015, and in table 28, the standardized coefficients for LogCT beta = 0.066 and LogET beta = 0.065. Consequently, H1, H2, and H3 were not supported for this set of data.

Table 26: Correlations for Model One of the Level of Social Competency

		Level of SC	LogETZero	LogCTZero	LogETCTZero
Pearson Correlation	Level of SC	1.000	.067	.068	-.056
	LogETZero	.067	1.000	.035	.128
	LogCTZero	.068	.035	1.000	.157
	LogETCTZero	-.056	.128	.157	1.000
Sig. (1-tailed)	Level of SC	.	.254	.252	.291
	LogETZero	.254	.	.364	.104
	LogCTZero	.252	.364	.	.060
	LogETCTZero	.291	.104	.060	.
N	Level of SC	99	99	99	99
	LogETZero	99	99	99	99
	LogCTZero	99	99	99	99
	LogETCTZero	99	99	99	99

Table 27: Model One Summary for the Level of Social Competency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.094 ^a	.009	-.012	35.9375	.009	.427	2	96	.654	
2	.121 ^b	.015	-.017	36.0204	.006	.558	1	95	.457	1.821

a. Predictors: (Constant), LogCTZero, LogETZero

b. Predictors: (Constant), LogCTZero, LogETZero, LogETCTZero

c. Dependent Variable: Level of SC

Table 28: Coefficients for Model One

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	286.667	3.612		79.368	.000					
	LogETZero	4.787	7.493	.065	.639	.524	.067	.065	.065	.999	1.001
	LogCTZero	5.050	7.830	.066	.645	.521	.068	.066	.066	.999	1.001
2	(Constant)	286.773	3.623		79.154	.000					
	LogETZero	5.487	7.568	.074	.725	.470	.067	.074	.074	.983	1.017
	LogCTZero	5.964	7.943	.077	.751	.455	.068	.077	.076	.975	1.026
	LogETCTZero	-13.406	17.945	-.078	-.747	.457	-.056	-.076	-.076	.960	1.041

a. Dependent Variable: Level of SC

Finally, after including the trust between a mentor and his protégée as a moderator to the second model, the results provided evidence to reject this model. The researcher ran a linear regression analysis with the outcome variable, the level of social competencies (LSC), and the predictor variables were Trust*LogET, the logarithmic transformation function of elapse-time moderated by trust; Trust*LogCT, the logarithmic transformation of communication time moderated by trust; and Trust*Log(ET*CT), the interaction between elapse-time and communication time after being moderated by trust. The correlations table 29 showed no multicollinearity.

Table 29: Correlations for Model One of the Level of Social Competency Moderated by Trust

		Level of SC	TLogETZero	TLogCTZero	TLogETCTZero
Pearson Correlation	Level of SC	1.000	.084	.053	-.023
	TLogETZero	.084	1.000	.063	.136
	TLogCTZero	.053	.063	1.000	.160
	TLogETCTZero	-.023	.136	.160	1.000
Sig. (1-tailed)	Level of SC	.	.203	.300	.411
	TLogETZero	.203	.	.268	.089
	TLogCTZero	.300	.268	.	.056
	TLogETCTZero	.411	.089	.056	.
N	Level of SC	99	99	99	99
	TLogETZero	99	99	99	99
	TLogCTZero	99	99	99	99
	TLogETCTZero	99	99	99	99

According to the table 30 Model Summary Moderated, the Model Summary, R squared for both models were low 0.09 and 0.011, and in table 28, the standardized coefficients for LogCT beta = 0.077, LogET beta = 0.074, and Log(CT*ET) beta = -0.78. Consequently, the hypotheses H4a, H4b, and H4c were also not supported.

Table 30: Model One Summary for the Level of Social Competency Moderated by Trust

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.097 ^a	.009	-.011	35.9268	.009	.456	2	96	.635	
2	.106 ^b	.011	-.020	36.0824	.002	.174	1	95	.678	1.798

a. Predictors: (Constant), TLogCTZero, TLogETZero

b. Predictors: (Constant), TLogCTZero, TLogETZero, TLogETCTZero

c. Dependent Variable: Level of SC

Hierarchical Regression Analysis for Balance of Social Skills

Hierarchical regression analysis was used to test H5, H6 and H7 because the communication-time, the predictor variables of H5, and the elapse-time, the predictor variable of H6 were supported by previous research while the interaction of both communication-time and elapse-time was based on the previously elaborated argument in the model building section. The outcome variable was the balanced social competencies (BSC) of protégée entrepreneurs, and the predictor variables were LogET, the logarithmic transformation function of elapse-time, and

LogCT, the logarithmic transformation of communication time. The method of regression was forced entry because the regression analysis was testing a theory (Studenmund, 2016). After specifying the first block in the hierarchy, the logarithmic function of the interaction of both communication-time and elapse-time Log(ET*CT) was added to the independent variables in block two while keeping a forced entry regression method.

After the test was run, the results provided no evidence that the communication-time between the mentor and her protégée and the elapse-time of a mentoring relationship were successful in predicting a balance social competencies of the protégée. According to the table 31 the variables were not highly correlated which implies no evidence for multicollinearity. In table 32, the Model Summary, R squared for both models were low 0.072 and 0.073, and in table 33, the standardized coefficients for TLogCT beta = 0.048 and TLogET beta = 0.081. Consequently, H5, H6, and H7 were not supported for this set of data.

Table 31: Correlations for Model One of the Balance of Social Competency

		Balance of SC	LogETZero	LogCTZero	LogETCTZero
Pearson Correlation	Balance of SC	1.000	-.179	-.206	-.086
	LogETZero	-.179	1.000	.035	.128
	LogCTZero	-.206	.035	1.000	.157
	LogETCTZero	-.086	.128	.157	1.000
Sig. (1-tailed)	Balance of SC	.	.038	.020	.200
	LogETZero	.038	.	.364	.104
	LogCTZero	.020	.364	.	.060
	LogETCTZero	.200	.104	.060	.
N	Balance of SC	99	99	99	99
	LogETZero	99	99	99	99
	LogCTZero	99	99	99	99
	LogETCTZero	99	99	99	99

Table 32: Model One Summary for the Balance of Social Competency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.269 ^a	.072	.053	3.503269919000000	.072	3.732	2	96	.027	
2	.271 ^b	.073	.044	3.519607855000000	.001	.111	1	95	.740	1.990

a. Predictors: (Constant), LogCTZero, LogETZero

b. Predictors: (Constant), LogCTZero, LogETZero, LogETCTZero

c. Dependent Variable: Balance of SC

Table 33: Coefficients for Model Two

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	286.624	3.611		79.373	.000					
	TLogETZero	.196	.246	.081	.798	.427	.084	.081	.081	.996	1.004
	TLogCTZero	.128	.272	.048	.473	.638	.053	.048	.048	.996	1.004
2	(Constant)	286.711	3.633		78.923	.000					
	TLogETZero	.210	.249	.087	.842	.402	.084	.086	.086	.980	1.021
	TLogCTZero	.146	.276	.055	.529	.598	.053	.054	.054	.973	1.028
	TLogETCTZero	-.269	.645	-.043	-.417	.678	-.023	-.043	-.043	.958	1.044

a. Dependent Variable: Level of SC

Finally, after including the trust between a mentor and his protégée as a moderator to the second model, the results provided evidence to reject this model. The researcher ran a linear regression analysis with the outcome variable, the balance of social competencies (BSC), and the predictor variables were Trust*LogET, the logarithmic transformation function of elapse-time moderated by trust; Trust*LogCT, the logarithmic transformation of communication time moderated by trust; and Trust*Log(ET*CT), the interaction between elapse-time and communication time after being moderated by trust. The correlations table 34 showed no multicollinearity.

Table 34: Correlations for Model One of the Balance of Social Competency Moderated by Trust

		Balance of SC	TLogETZero	TLogCTZero	TLogETCTZero
Pearson Correlation	Balance of SC	1.000	-.199	-.199	-.072
	TLogETZero	-.199	1.000	.063	.136
	TLogCTZero	-.199	.063	1.000	.160
	TLogETCTZero	-.072	.136	.160	1.000
Sig. (1-tailed)	Balance of SC	.	.024	.024	.241
	TLogETZero	.024	.	.268	.089
	TLogCTZero	.024	.268	.	.056
	TLogETCTZero	.241	.089	.056	.
N	Balance of SC	99	99	99	99
	TLogETZero	99	99	99	99
	TLogCTZero	99	99	99	99
	TLogETCTZero	99	99	99	99

According to the table 35 Model Summary Moderated, the Model Summary, R squared for both models were low 0.075 and 0.075, and in table 33, the standardized coefficients for TLogCT beta = 0.055, TLogET beta = 0.087, and TLog(CT*ET) beta = -0.43. Consequently, the hypotheses H8a, H8b, and H8c were also not supported.

Table 35: Model One Summary for the Balance of Social Competency Moderated by Trust

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.273 ^a	.075	.055	3.498636497000000	.075	3.870	2	96	.024	
2	.274 ^b	.075	.046	3.516498365000000	.000	.027	1	95	.869	1.984

a. Predictors: (Constant), TLogCTZero, TLogETZero

b. Predictors: (Constant), TLogCTZero, TLogETZero, TLogETCTZero

c. Dependent Variable: Balance of SC

DISCUSSIONS

According to the results, the hypotheses representing both models are not supported by the data-set of this research. Moreover, the time invested in a mentoring relationship between an incubated entrepreneur at Ryerson Incubators and her mentor does not predict the development of her social competencies. There are four possible reasons for the rejection of the hypotheses. First, there is a possibility that the measures used are not valid for the participants in this research. Second, the data collected might have come from a sample set that poorly represents the total population. Third, the controlled variables may have influenced the outcome variable. Finally, the hypotheses, although they are based on theories in the academic literature, might not

be an accurate representation of reality. This chapter discusses these four possible reasons in detail.

Social Skills Inventory (SSI) Reliability

Of the four measures used in this research, the SSI is the only one that has not been validated for its reliability to measure social competencies for this data set. The measures for elapse-time and communication-time are both direct reports, and the BRPTI that measures trust has already been validated before testing the hypotheses for this data set.

Therefore, the Scale Validity test in SPSS is used to check the reliability of the SSI. When checking the Cronbach's alpha for the 15-item SSI, it shows 0.380. The acceptable alpha for such a test should be >0.7 (Kline, 2013).

Furthermore, the scale validity test for each of the six elements of the Social Skills Inventory is also below the acceptable 0.7 as presented in table 36. The three-item emotional expressivity scale has an alpha of 0.217. The three-item emotional sensitivity scale has an alpha of 0.519. The three-item emotional control scale has an alpha of 0.295. The two-item social expressivity scale has an alpha of 0.383. The two-item social sensitivity scale has an alpha of 0.235. The two-item social control scale has an alpha of 0.526. Therefore, the social skills inventory, as a holistic inventory, is an unreliable measure for the levels of competencies or the balance of competencies of the participants in this research. Moreover, the relevant items even fail to measure any of the six predefined scales of the social skills inventory.

Table 36: SSI Reliability Tests

Elements	Cronbach's Alpha	Number of Items
SSI	0.380	15
Emotional Expressivity (EE)	0.217	3
Emotional Sensitivity (ES)	0.519	3

Emotional Control (EC)	0.295	3
Social Expressivity (SE)	0.383	2
Social Sensitivity (SS)	0.235	2
Social Control (SC)	0.526	2

Issues with Sampling

There is low probability that the sample used is unrepresentative of the total population. The participants are all recruits from incubators affiliated with Ryerson University. All ten incubators are located within the same geographical area of downtown Toronto. The 99 participants represent more than 20% of all entrepreneurs located at the relevant incubators. The ratio of participants to approached entrepreneurs is 99 to 100.

Although the sample size is considered healthy in its size, several participants might have filled the survey improperly, and the number of these participants is unknown. Some participants might have filled the survey under the pressure of time. This could have caused them to rush into answering the questions without fully understanding them.

Many participants have more than one mentor, and this could have led to confusion when answering the questions. While some participants have raised the question of having more than one mentor, other participants might have had the same concerns without seeking clarification. In such a case, they could have acted based on their own judgment. Participants making judgement calls while filling the survey come from the same open environment. Being from the same environment, participants could have had a similar judgement call that has led to a common factor that has not been randomized.

After going over the list of mentors submitted by participating entrepreneurs, some mentors turned out not to fit the definition of mentors used in this research. The argument that

supports the suggested model is based on mentors that are successful entrepreneurs. While successful entrepreneurs might be debatable, some mentors were not even entrepreneurs. They were faculty members with no previous entrepreneurial experience. In the argument that lead to the development of the tested model, mentors were expected to have a social capital relevant to their protégée-entrepreneurs. This relevant social capital position the mentor as a socially competent entrepreneur in the eyes of his protégée-entrepreneur. While this can be true in the case of entrepreneur-mentors, it might not be true in the case of faculty-mentors. Further investigation is needed to verify if the faculty-mentors can support their protégée-entrepreneurs with relevant social capital. In the meanwhile, this is another limitation of this research.

Issues with Controlled Variables

There is a possibility that the controlled variables are not properly fixed in this research. The industry of participants and their entrepreneurial environment variables are the controlled variables of this research. While the participants are classified under the high-tech industry, the definition of high-tech is wide enough to include entrepreneurs from any industry with new technological innovations (Hramtsov, Evdokimov, Lodigin, & Budkevich, 2014). As an example, entrepreneurs from the Fashion Zone Incubator are developing technologies for the fashion industry, entrepreneurs at the Transmedia Zone are developing new gaming technologies, entrepreneurs at the Biomedical Zone are developing technologies for the healthcare industry, and entrepreneurs from the Legal Innovative Zone are developing technologies for the legal industry. They all have a software development component in their new innovations; consequently, they are all eligible to join the DMZ, the biggest zone. Participants from the DMZ and the other zones are affiliated with various industries. If the influence of their traditional industries is of marginal size, the industry variable cannot be considered a controlled variable anymore.

It is probable that the controlled variables have a bigger influence than the predictor variables on the outcome variable. The industry of participants and their entrepreneurial environment variables might have more influence on their social competencies than the mentoring time of these participants. Entrepreneurs from the Fashion Zone, working in the fashion industry and interacting with retailers that expect good customer services, might develop more social competencies than entrepreneurs from the Transmedia Zone working in the virtual gaming industry that does not require direct human interaction. Also, entrepreneurs, working from the DMZ, which is an open workplace for more than two hundred members, might develop more social competencies than entrepreneurs working in the highly technical thirty-member Biomedical Zone. Consequently, the controlled variables of industry and environment might have a bigger influence on the social competencies of the participants than their communication-time and elapse-time with their mentors.

There is a probability that some supposedly randomized variables are significantly influential and not properly randomized among the participants. Variables that are neither considered predictor variables nor controlled variables are expected to be randomized among the participants. These variables have not been accounted for in the model. One potentially randomized variable is the previous experience of entrepreneurs. Entrepreneurs at the Ryerson Zones are very diverse. They come from different career backgrounds. Participants from different career paths might have developed different social competencies. The survey does not capture this diversity that might have influenced the social competencies of the participants more than expected and that might not have been randomized among the sample group of participants.

The personality of participants is another variable that is not accounted for in this research. Competencies are defined as the combination of knowledge, skills, and personality

traits. While knowledge and skills have been accounted for when measuring the social competencies of participants, personality traits are expected to be randomized. There could have been a possibility that the personality traits of participants are not randomized because this research is cross-sectional and not longitudinal. A longitudinal research would have tracked the variables of a participant over time while in this cross-sectional research, the researcher measures the variables of participants in different stages of mentoring relationships. The time frame of one year to finish this research does not allow the investigator to design a longitudinal research. Consequently, the personality traits of participants might not have been randomized as expected; thus, the hypotheses might have been rejected because they ignored an active variable.

Issues with Hypotheses

According to the literature, social competencies of protégée-entrepreneurs are influenced by the social competencies of their mentors (Jack & Anderson, 2002; Mitchelmore & Rowley, 2010). However, mentors, having different levels of social competencies, could have different impacts on the social competencies of their protégées. This research does not take into consideration the social competencies of the mentors. The difference between the social competencies of mentors and those of their protégées might have been a better outcome variable for this research, rather than the level of the social competencies of protégées. While this modification could have corrected hypotheses H1, H2, H3, H4a, H4b, and H4c, which have the level of social competencies of protégée-entrepreneurs as outcome variable, accounting for the social competencies of mentors does not change hypotheses H5, H6, H7, H8a, H8b, and H8c. For the latter set of hypotheses, the outcome variable is the balance of social competencies of protégée-entrepreneurs.

The models tested in this research could have been miss-specified. While the models identify communication-time and elapse-time as predictor variables, and the level and balance of

social skills as outcome variables, the relationship could have been the reverse. A long and active mentoring relationship could be an outcome of high-leveled and well-balanced social competencies of protégée-entrepreneurs. Some protégée-entrepreneurs could have recorded high elapse-time and communication-time because they are socially competent in the first place; thus, they are capable of accurately expressing their emotions and needs as well as flawlessly understand the emotions and needs of their mentors. Socially competent entrepreneurs are capable of building and maintaining mentoring relationships better than socially incompetent entrepreneurs. In this case, the predictor variable could have been the level and balance of social competencies of protégée-entrepreneurs, and the outcome variable could have been the active mentoring time.

Future Research

While issues with sampling, controlled variables, and the hypotheses of this research are probable, there is a statistically supported evidence that the Social Skills Inventory used to measure the level and balance of social competencies of the protégée-entrepreneurs is unreliable for the participants of this research. Researchers who wish to study social competencies of entrepreneurs need a reliable and valid measure of social competencies. The researcher considers developing an inventory to measure social competencies as number one suggestion for future research.

While entrepreneurs of different industries might have different levels of social competencies, entrepreneurs of the diverse high-tech industry might have wide variations in their levels of social competencies. Future research can be a comparative study of the social competencies of entrepreneurs in the high-tech industry with the social competencies of entrepreneurs from traditional industries. It is valuable to understand how the socially competent entrepreneurs are distributed across various industries.

While personality traits of entrepreneurs, in general, have been studied before, personality traits of entrepreneurs in high-tech incubators has not been fully explored yet. Future research can be an analysis of the big five personality traits for entrepreneurs at high-tech incubators. From the findings of previous studies, there is no difference between the personality traits of entrepreneurs and the personality traits of the public. It is valuable to confirm that the previous findings also hold for entrepreneurs at high-tech incubators.

CONCLUSION

Although the two models tested that predict a role for communication-time, elapse-time and trust in developing the social competencies of entrepreneurs are based on theories from the literature, the outcome of this research does not support the hypotheses emerged from both models. The social competencies of incubated entrepreneurs might still develop because of their mentoring relationships as the models predict, but there is a need to have a reliable and valid measure of the social competencies of entrepreneurs. The Social Skills Inventory used in this research to measure the social competencies of protégée-entrepreneurs is not valid for the set of participants. This is the most probable reason behind the rejection of both models although it is not the only possible reason. Consequently, a possible future research can be to develop a reliable scale that can measure the social competencies of entrepreneurs.

APPENDIX

Survey Questionnaire

Q1 Incubator that you are currently affiliated with:

Q2 Gender:

- ☐ Male
- ☐ Female
- ☐ Other

Q3 Your Current Mentor is:

- ☐ Andrea Romero
- ☐ Rajen Sanghvi
- ☐ Bradely Poulos
- ☐ Michelle Caers
- ☐ Dave Chalmers
- ☐ Other, First and Last name of your mentor _____

Q4 Your mentoring relationship started:

_____ Year
_____ Month

Q5 How many FACE to FACE meetings do you have with your mentor on a typical MONTH:

_____ meetings per month

Q6 How much time would an average Face to Face meeting with your mentor last for:

_____ Hours
_____ Minutes

Q7 How many calls do you have with your mentor over the PHONE on a typical MONTH: (this includes VOIP, Skype, FaceTime, ...)

_____ calls per month

Q8 How much time would an average call last for:

_____ Hours
_____ Minutes

Q9 How many EMAILS or TEXT messages do you exchange with your mentor on a typical WEEK:

_____ text per week

Q10 How much TIME do you spend on READING and REPLYING to a typical email or text messages from your mentor:

_____ Minutes

Then, using the scale shown below, decide which response will most accurately reflect your answer and select the appropriate circle. Note that you will need to work from left to right when answering.

1 = Not at all like me 2 = A little like me 3 = Like me 4 = Very much like me 5 = Exactly like me

	Not at all like me	A little like me	Like me	Very much like me	Exactly like me
1.It is difficult for others to know when I am sad or depressed.					
2.When people are speaking, I spend as much time watching their movements as I do listening to them.					
3.People can always tell when I dislike them, no matter how hard I try to hide my feelings.					
4.I enjoy giving parties.					
5.Criticism or scolding rarely makes me feel uncomfortable.					
6.I can be comfortable with all types of people, young and old, rich and poor.					
7.I talk faster than most people.					
8.Few people are as sensitive and understanding as I am.					

<p>9.It is often hard for me to keep a "straight face" when telling a joke or humorous story.</p> <p>10.It takes people quite a while to get to know me well.</p> <p>11.My greatest source of pleasure and pain is other people.</p> <p>12.When I'm with a group of friends, I am often the spokesperson for the group.</p> <p>13.When depressed, I tend to make those around me depressed also.</p> <p>14.At parties, I can immediately tell when someone is interested in me.</p> <p>15.People can always tell when I am embarrassed by the expression on my face.</p>					
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Q12 The following pages are 10 statements that may or may not be a characteristic or descriptive of your relationship with your mentor.

Answer the questions in terms of what you would actually do in dealing with your mentor.

The response format is:

1= extremely unlikely, 2= quite unlikely, 3= slightly unlikely, 4 = neither, 5= slightly likely, 6= quite likely, and 7= extremely likely.

	Extremely unlikely	Moderately unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Moderately likely	Extremely likely
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1.I think carefully before telling my mentor my opinions.							
2.I watch my mentor carefully in order to make sure he/she doesn't do something unfavorable to my start-up.							
3.I agree with my mentor just because he said so.							
4.I give my mentor all known and relevant information about important issues even if it is critical information about my start-up.							
5.I give my mentor all known and relevant information about important issues even if it might jeopardize my position as his/her protégée.							
6.I feel confident asking my							

mentor to do something for me.							
7.I agree with my mentor even though he/she would not suffer any negative consequences.							
8.I minimize the information I give to my mentor.							
9.I check with other people about the suggestions of my mentor to make sure he/she is giving me a good advice.							
10.I deliberately withhold some information when communicating with my mentor.							

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