

# Effectiveness of the University Entrepreneurial Eco-system in the Growth of Entrepreneurship and Threshold Capability Development of Students

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## **ABSTRACT**

This case study features an exploratory investigation involving capability development among technologically oriented student entrepreneurs within the University of Ottawa's entrepreneurial ecosystem. Utilization took place of a mixed methods approach involving a survey of student entrepreneurs, interviews with facilitators and student entrepreneurs, and secondary data where possible. This mixed methods approach was necessary to collect a 'thickness' of data to justify a case study research design, including a check for robustness such as to demonstrate 'trustworthiness' of the data. Unique insights build on existing literature to offer a contribution to knowledge. Although the university ecosystem offered varied supporting mechanisms, perceived barriers also existed. Moreover, invariably the development of threshold rather than dynamic capabilities took place. Implications for practitioners follow from the theoretical contributions in order to facilitate a more effective university entrepreneurial ecosystem. In particular, a need exists to enhance the development of capabilities that build traction and scalability.

## **PREFACE**

I am a lifelong learner who wanted to understand what I can do to be a better person and leader. I chose to study entrepreneurship, as my passion for entrepreneurship and problem solving began in my junior year when I was looking for a platform to develop and showcase my skills. Starting my master's degree as an international student in Canada, I was exposed to a tremendous amount of opportunities and an environment that was competitive to incentivize me. My time in Canada and the masters degree from the University of Ottawa has helped me develop skills and not least learn a strategic approach to problem-solving. These insights offered me the platform to provide value through theory for the fellow student entrepreneurs struggling to thrive in the University of Ottawa's entrepreneurial ecosystem.

I take this opportunity to thank the University of Ottawa for offering me this great learning experience. I also want to thank my thesis supervisor and examiners for all their time and attention to my dissertation. I appreciate their feedback and efforts in making me a better researcher and learning throughout the entire process. A special thanks to Dr. David Crick, my thesis supervisor, for the time and dedication towards my work. I thank my parents for giving me this opportunity to gain international studying experience and funding my education. Lastly, I want to thank my friends who helped pull me through the rough days to actually complete this dissertation successfully.

# CHAPTER 1. INTRODUCTION

## 1.1 Introduction

The objectives of this exploratory case study in the specific context of the University of Ottawa (uOttawa) are two-fold. First, to investigate the capabilities that students pursuing entrepreneurial ventures perceive as important to help facilitate their sustainable start-up enterprise. Second, to evaluate students' perceived effectiveness of the university's entrepreneurial ecosystem that facilitates the development of these capabilities. For clarity, the term 'sustainable' means 'enduring' in this proposed investigation (as per Jaskiewicz et al., 2016) as opposed 'green/eco-oriented' or similar, because discourse varies in earlier studies. This current study contributes to existing knowledge regarding the 'capabilities' perspective as part of the wider resourced-based view, namely, as a theoretical lens underpinning this investigation. Specifically, the notion of developing threshold capabilities as opposed to existing literature focusing on dynamic capabilities.

In terms of the importance of this study, although not exclusive to the student population, for some time, recognition exists that many firms across a number of countries fail for a variety of reasons (Everett & Watson, 1998; Ucbasaran et al., 2010; Blank, 2013). Indeed, regarding the timeliness of this investigation and in particular within a Canadian context, according to the Business Development Bank of Canada (BDC, 2020), "*most of the start-ups fail in Canada within their first year of operation*". Statistics Canada's entrepreneurship indicators database identified that there were 1,138,170 active enterprises in Canada with one or more employees in 2018. Of those, 64.8% had four or fewer employees. The high growth enterprises with ten or more employees accounted to only 3.3% (Statistics Canada, 2020). However, regarding start-ups more broadly, research suggests those failing in many cases involved 'technologically-oriented' ventures (Steffensen et al., 2000; Law & Breznik, 2017;

Sheriff & Muffatto, 2018). An argument exists that the failure of start-ups, including those operated by student entrepreneurs, could be due to the lack of their capabilities to sustain their business in the market (Saukkonen et al., 2016). It follows that they need to be equipped with the essential capabilities/skills that help them launch their start-ups (as per Chesbrough, 2010). Nevertheless, an under-researched area involves the question of what specific capabilities are required to exhibit a threshold level; for example, do student entrepreneurs possess the capabilities to validate their respective evolving business model (following Ostwalder & Pigneur, 2010; Gassmann et al., 2014). Such a consideration needs placing in the context of various universities spending a considerable amount of resources to facilitate student entrepreneurship (Jena, 2020). Alongside their traditional teaching activities, certain universities face a challenge to endow their students with the appropriate motivation, knowledge and abilities for firm creation (Haase & Lautenschläger, 2011; Fletcher & Harris, 2012; Martínez-Fierro et al., 2020).

The focus of this current study on capability development regarding technologically oriented student start-ups is of practical importance, since the later findings indicate that student entrepreneurs often want to start technology related new ventures and in particular, those associated with apps; however, they experience problems in developing the perceived capabilities necessary to facilitate sustainable start-ups. This study has importance in respect of academic knowledge because existing studies have tended to focus on the development of 'dynamic' capabilities (as per Teece et al., 1997; Teece, 2012; 2014; 2018). Nevertheless, in reality, a debate exists regarding the ability of certain owner-managers in respect of rapidly gaining certain capabilities, what these involve; more specifically, whether they are simply threshold as opposed dynamic in nature (as per Johnson et al., 2014; Hatt, 2018; Crick, 2021). This recognition is especially important in the context of this current study because prior

literature remains under-researched in respect of the capabilities required by student entrepreneurs involved in technologically oriented start-ups; also, whether universities' ecosystems effectively facilitate the development of 'appropriate' capabilities.

In terms of clarity, understanding key concepts under investigation is useful. First, a body of knowledge exists regarding the notion of educating entrepreneurs, especially 'student entrepreneurs' and the role of 'university ecosystems' that include facilitators together with education programs (O'Shea et al., 2005, Astebro et al., 2012; Klofsten et al., 2019; Marzocchi et al., 2019; Snihur et al., 2021). The research boundary (as per Stake, 1995) in this current study involved 'enrolled' (rather than alumni) students from across uOttawa together with staff engaged in entrepreneurial teaching and facilitation (more details feature in the Methodology chapter). Second, a body of knowledge exists on the nature of 'technology'; indeed, whether firms are involved in products and/or services. To illustrate, Bell et al. (2004) note that terminology differs across studies, such as 'traditional' to signify low-tech firms through to 'knowledge-intensive' to represent hi-tech firms. Furthermore, as far back as the 1970's in an era prior to the prevalence of apps and a variety of other digital technology, Shostack (1977) noted that a continuum exists between physical as opposed to services, with certain firms employing business models at some stage in that continuum. Therefore, given levels of technology in new ventures varies including hardware and software especially with digital components, 'technologically-oriented' is a broad, generic term considered suitable to cover the start-ups under investigation in this current study. This notion is especially pertinent, since irrespective of the faculty in which students were registered (Telfer School of Management or another faculty like Social Sciences, Engineering, etc.), they would still need to have involvement in a 'technologically-oriented' start-up to be included.

Third, a body of knowledge exists in respect of the issue of ‘capabilities’. Dynamic capabilities represent a firm’s ability to sense, pursue and reconfigure opportunities and resources in response to quickly shifting environmental condition (Teece et al., 1997). In contrast, threshold capabilities are those that allow a firm to achieve parity with rivals (as per Johnson et al., 2014). Entrepreneurs’ capabilities can vary, respectively rooted in a venture’s organisational and managerial processes and activities (Helfat & Winter, 2010; Kindström et al., 2013; Teece et al., 1997). To make this current study manageable, it draws specifically on entrepreneurial marketing capabilities given that the facets of business models (as per Osterwalder & Pigneur, 2010; Gassmann et al., 2014) reflect this cross-disciplinary literature at the marketing/entrepreneurship interface (see Crick & Crick, 2018; Eggers et al., 2020; Hansen et al., 2020). For example, Morris et al. (2002) summarises and illustrates the following as marketing elements with respect to the three dimensions of marketing. (a) Proactive orientation (b) opportunity driven (c) customer intensity (d) Innovation focused (e) risk management (f) resource leveraging and (g) value creation.

## **1.2 Statement of Problem and Research Questions**

The prior mentioned introduction section suggests certain students in universities are potentially not equipped with appropriate capabilities to start and sustain their business, namely, the problem issue under investigation. Although ideally, universities should facilitate the development of dynamic capabilities (as per Teece et al., 1997), whereas in reality, potentially only threshold capabilities are likely (following Johnson et al., 2014). Consequently, this current study focuses on the notion of threshold capability development among student entrepreneurs involved in technologically oriented start-ups at uOttawa (namely, the research boundary, representing an entrepreneurial ecosystem).

This study investigates the following research questions from the perspective of students and facilitators. (1) What are the threshold capabilities student entrepreneurs developing their start-ups need to achieve to help make their firms sustainable? (2) How does the uOttawa's entrepreneurial ecosystem support the students in respect of obtaining the threshold capabilities needed to facilitate the sustainability of their start-up firm? (3) What are the barriers faced by students in uOttawa's entrepreneurial ecosystem in respect of obtaining the threshold capabilities needed to facilitate the sustainability of their start-up firm?

### **1.3 Structure of the Thesis**

Chapter 1 outlines the background of this thesis, together with objectives, research questions and propositions. Chapter 2 subsequently outlines the underpinning literature, followed by the methodology employed in Chapter 3. The mixed method results then follow in the context of the University of Ottawa in Chapter 4, before the study ends with the discussion of the results, implications and avenues for future research in Chapter 5.

## **CHAPTER 2. LITERATURE REVIEW**

### **2.1 Introduction**

Chapter 1 provided an overview of this study and presented the objective, research questions and statement of the problem. This chapter provides the academic underpinning to this investigation. Specifically, an overview of the literature pertaining to student entrepreneurship, capability development (dynamic capabilities and threshold capabilities), together with university entrepreneurial ecosystems, with reference to a prevalence of encouraging start-ups with a technologically oriented business model.

### **2.2 Student Entrepreneurship**

Engaging in entrepreneurship is becoming increasingly appealing to people who are about to make their career choice as this option enables labour market participation while retaining personal independence (Martínez et al., 2007). In fact, young individuals may boldly rush into entrepreneurial initiatives employing effectual strategies and bootstrapping mechanisms (Hulsink & Koek, 2014). Nevertheless, Shirokova et al. (2016) suggests that a rather large segment of the population intends to pursue an entrepreneurial career while they are relatively young. Therefore, student entrepreneurship is an important direction of entrepreneurship research as that is often the stage of life when forming a positive attitude towards an entrepreneurial career takes place. A definition of student entrepreneurship varies and according to Reynolds (2005), it involves any attempt to launch a new venture undertaken by one or several students. This work of Reynolds (2005) excludes entrepreneurs who start their firm immediately after they graduate despite developing their skills at the university together with their entrepreneurial idea. The involvement of students in entrepreneurial activity depends on their career plans and attitude towards self-employment, which in turn depends on

many factors such as their idea about entrepreneurship, field of expertise and the capabilities perceived by them as important (Shirokova et al., 2016).

The readiness to move from planned to actual behaviour primarily depends on the individual characteristics of an entrepreneur (Jain & Ali, 2013), although that is not restricted to students. These characteristics vary; for example, based on their age (Alvarez et al., 2011; Levesque & Minniti, 2011), gender (Zhao et al., 2005), family background (Kolvereid, 1996) and capabilities (Teece, 2012). Apart from personality characteristics, environmental variables also affect individuals' entrepreneurial intentions and subsequent behaviour (Sesen, 2013). An ecosystem that is discussed shortly therefore plays an important role in facilitating entrepreneurship (Bloom & Dees, 2008). Consequently, the university environment is potentially important in leading to the creation of entrepreneurial thoughts and intentions; it also plays a major role in supporting the students in the development of their personality traits and characteristics by enabling skill and capability development.

Introducing the concepts of 'enterprise' and/or 'entrepreneur' in higher education can influence students' perception towards entrepreneurship as well as their awareness towards other employment options (Kassean et al., 2015; Kubberod & Pettersen, 2017). Entrepreneurial education can influence the performance of entrepreneurs by enhancing issues like their profitability, entrepreneurial spirit, entrepreneurial attitudes, and chances of survival (Ho et al., 2018). Additionally, entrepreneurship, as a domain of business education, has an eclectic nature where the content arises from diverse disciplines including those of finance, marketing and/or strategy (Pardo, 2013). Recognition exists of the importance of entrepreneurship education to the economy; for example, facilitating rapid growth (Kassean et al., 2015; Warnecke, 2013). Entrepreneurship education is considered as one of the most innovative and influential forces

that determine the health of the competitive economy of any country (Jena, 2020). However, policymakers and educators need a thorough understanding of the diverse and alternative aims and objectives of entrepreneurial education to succeed (Jena, 2020).

### **2.3 Capability Development**

Entrepreneurship as a research field is highly diverse and growing, with earlier research stressing the need to continue developing fundamental hypotheses/propositions to understand the phenomenon better (Alvarez et al., 2011; Carlsson et al., 2013). This current study features the topics of capability development among technologically oriented student entrepreneurs and the role of ecosystems in facilitating those capabilities; hence, it is important to consider earlier research to underpin this investigation. Knowledge-intensive, creative entrepreneurs are interested in technology development; not least, extracting capital and innovations from their innovation system, and bringing change and dynamism into the economy (McKelvey et al., 2019; Pardo, 2013). In claiming that entrepreneurship drives economic development, the work some time ago by Schumpeter (1934) helps explain the entrepreneurial process through which entrepreneurs play a key role in stimulating economic dynamism via the use of ideas and technical developments, access to finance and transformation of those ideas into technological, commercial and organisational innovations (Kurz, 2012). Inspired by Schumpeter's research and more recent studies, McKelvey et al. (2019) outline certain entrepreneurial characteristics.

1. Takes risks and reaps profits.
2. Turns technology and ideas into innovations in the market.
3. Enables new combinations.
4. Faces uncertainty about current choices concerning future outcomes.

5. Creates opportunities, by both driving and adapting to change in the external environment.
6. Acting as a disruptive, disequilibrium force, which arises endogenously in the economy.
7. Driving wider processes of economic dynamism, which in turn leads to economic growth and societal well-being.

Supporting assertions in the last chapter, Saukkonen et al. (2016) note that the failure of student start-ups could be due to the lack of their capabilities to sustain their business in the market. However, a body of literature exists on the nature of capabilities more broadly. First, 'dynamic capabilities' refer to entrepreneurs' ability to: "*integrate, build, and reconfigure internal and external competences to address rapidly-changing (dynamic) environments*" (Teece et al., 1997, p. 524). Dynamic capabilities enable firms to introduce new products and processes and adapt to changing market conditions (Belz & Binder, 2017; Helfat & Raubitschek, 2000). High performers in the global marketplace have typically been firms that can demonstrate timely responsiveness, rapid and flexible product innovation coupled with the management capability to effectively coordinate and redeploy internal and external competences (Teece et al., 1997). Arguably, while they may aspire to possess dynamic capabilities, due to typical issues such as student entrepreneurs having limited knowledge/experience, funds and time, the likelihood of rapidly developing dynamic capabilities is questionable. Instead, this current study considers the notion of 'threshold capabilities', namely, "*the capabilities needed for an organization to meet the necessary requirements to compete in a market and achieve parity with its competitors in that market*" (Johnson et al., 2014, p. 73). Further consideration of dynamic and threshold capabilities now follow in greater depth.

## 2.4 Dynamic Capabilities

Student entrepreneurs may struggle to achieve dynamic capabilities due to issues like their limited funds, knowledge and time. However, to become viable, scalability may prove important whereby Teece (2012) suggests that it is typically necessary for the firm to have the second-order set of capabilities, namely, dynamic capabilities, to facilitate a desired degree and rate of growth in terms of expansion and profit. Indeed, Teece (2014) highlights the importance of entrepreneurs having the capacity to renew competencies to achieve congruence with the changing business environment.

The design and operation of business models are dependent on a firm's capabilities, and the crafting, refinement, implementation, and transformation of business models are outputs of higher-order (dynamic) capabilities (Teece, 2018). As previously alluded to, they are higher-level competencies that determine the firm's ability to integrate, build, and reconfigure internal and external resources and competences to address, and possibly shape, rapidly changing business environments (Teece, 2012, 2014; Teece et al., 1997). They determine the speed at, and the degree to which, the firm's particular resources can be aligned and realigned to match the requirements and opportunities of the business environment to generate sustained positive returns. For this to occur, the alignment of resources/capabilities both inside and outside the firm includes assessing when and how the enterprise ought to form alliances with other organizations (Teece, 2012).

In reality, forming alliances may be difficult for early stage entrepreneurs (and student entrepreneurs in particular), but networking among various stakeholders is important in validating business models (Osterwalder & Pigneur, 2010; Gassmann et al., 2014). Martínez-Fierro et al. (2016) describes cross-functional R&D teams, innovative product development

routines, quality assurance processes, technology transition, information transition procedures, and other performance assessment mechanisms as important elements of diverse capabilities. However, typically small-scale student start-ups are unlikely to possess such capabilities. Capabilities are not only based on individual skills, but also on mutual experience resulting from how workers function together, as well as on specific equipment or services to which the organization has access to (Teece, 2012). As such, a capabilities perspective is consistent as a sub-set of resource-based theory (Barney, 1991, 2018) and consideration in this current study features this perspective as an underpinning theoretical lens.

According to Teece (2012), the longer an entity has been around, and the larger it is, the less its capabilities depend on particular individuals. These individuals are the entrepreneurs identified as potential business owners of the respective firms (Dwyer & Kotey, 2016). Entrepreneurs must be resilient to ensure the sustainability, viability and sustainable growth of their firms. However, resilience is a latent function because it is not possible to determine the entrepreneurial firm's "resilience ability" until it demonstrates a resilient response to a disruptive case (Linnenluecke et al., 2017). To link such considerations to a forthcoming section, Yuan et al. (2018, p. 35) investigated the question of "*why do some universities enjoy better university technology transfer performance than other universities?*" They identified student capability development as a major factor leading to better university technology transfer. Consequently, enhancing student entrepreneurs' capabilities would be a major factor in promoting technology transfer from universities to useable products in the economy (Jena, 2020; Yuan et al., 2018).

## 2.5 Threshold Capabilities

The previously mentioned dynamic capabilities reflect the ability of entrepreneurs to (1) recognize opportunities; (2) exploit opportunities; and (3) reconfigure assets and business models to meet the demands of changing environments (Augier & Teece, 2009; Teece, 2014). In terms of entrepreneurship development and creating an effective university entrepreneurial ecosystem (discussed shortly), universities should help students to build and improve difficult-to-imitate dynamic capabilities which are more likely to be successful than those that do not have the mentioned capabilities (as per Este, 2008; Leih & Teece, 2016). Under-resourced students within the ecosystem might not be able to rapidly develop the core competencies identified to become ‘dynamically’ capable to run a sustainable business. However, they could more easily develop the minimum threshold of capabilities required to start an entrepreneurial firm as soon as they graduate or while enrolled in university. Indeed, there are various limitations to students in the development of their capabilities while in university (Jena, 2020). Some of the limitations could be lack of actual work experience in the industry and lack of capability to handle complex industry problems (McKelvey et al., 2019). Hence, in this current study, consideration follows of threshold capabilities as the basic set of capabilities that students could develop at university to help become an entrepreneur.

The existing literature remains under-researched concerning the threshold capabilities (Crick, 2021) that entrepreneurship education is expected to evoke. This is somewhat surprising given that entrepreneurship can lead to positive outcomes like becoming self-sufficient in addition to developing the national economy (as per Kusumajanto, 2015). Indeed, the impact of entrepreneurship education was seen as one of the main factors in the growth and development of the younger generation's creativity, spirit and entrepreneurial behaviour (Kusumajanto, 2015). This is because entrepreneurship education can shape the

mindset, attitudes, and behaviour in students to help them become an entrepreneur; in turn, that directs them to choose entrepreneurship as a career option (Kusumajanto, 2015). According to Crispin et al. (2016), capabilities facilitate the ability to respond to previously unseen problems. In addition, these need to be studied further to determine whether the presence of entrepreneurship courses and the associated ecosystem can provide the capabilities to support students' ideas, to be resilient enough, to successfully turn their ideas into profit, and to keep their business running (Hulsink & Koek, 2014; Martínez et al., 2007). Mechanisms exist to facilitate capability development in student entrepreneurs.

Saukkonen et al (2016) discuss the need for universities to collaborate with existing industry start-ups for entrepreneurship coaching since the dynamics of start-up companies are different from those of established industries. Universities also need to step out from their comfort zone to design and test new modes of working (Mohr et al., 2010). Turning now to specific sector considerations, technologically oriented firms differ in scale, revenue, activities, and organisation. By way of example, due to potentially operating in nice markets, some need a business model that exhibits an ability to internationalise, in some cases rapidly, to exploit windows of opportunity (Crick & Spence, 2005; Spence & Crick, 2006). As technologically oriented start-ups mature, the capabilities needed for success are likely to vary (Marmer & Herrmann, 2011). These factors suggest that such start-up companies may reap significant benefits from enterprise–education interaction, since their knowledge resources are limited in size and variety, especially in the case of student entrepreneurs.

In short, the existing literature remains relatively under-researched concerning the nature of universities developing capabilities among student entrepreneurs in starting their entrepreneurial firm and in technologically oriented firms especially. That said however, a

likelihood exists that capability development may involve threshold as opposed to dynamic capabilities. Consideration of entrepreneurial ecosystems follow.

## **2.6 Entrepreneurial Ecosystem**

Researchers have used the term "ecosystem" to describe the nature and complex interaction of economic communities that operate based on the interaction of individuals, roles, infrastructure, and organizations like business and government (see, Bloom & Dees, 2008; Moore, 1993). The term 'entrepreneurial ecosystem' has become widely adopted in existing studies, although mechanisms vary and include accelerators, incubators, science parks, and universities (Phan et al., 2005; Kingma, 2014; Rice et al., 2014; Auerswald, 2015; Bell-Masterson & Strangler, 2015; Guerrero et al., 2016; 2018; Mian et al., 2012; 2016; Miller & Acs, 2017; Breznitz & Zhang, 2019). Some universities are more entrepreneurial in comparison to others in supporting their regions (Pugh et al., 2018). An entrepreneurial ecosystem was viewed by Belz & Binder (2017) as a guide for policymakers in the design and implementation of entrepreneurship policies. As a result, many of the entrepreneurship policies adopted in developed countries are based on the entrepreneurial ecosystem approach (Belitski & Heron, 2017). This literature is consistent with an entrepreneurial ecosystem representing a social and economic environment affecting local or regional entrepreneurship (Stam, 2014). In fact, at a very local level, businesses located within places serving as incubators for creativity, innovation, and entrepreneurship often have a greater chance of success (Bosma & Stam, 2012). Some of this existing research alludes to Entrepreneurship and Innovation Intermediaries [EIIs] within an ecosystem. This current study focuses on the effectiveness and actions of universities as these are important in contributing to the local entrepreneurial ecosystem. Specifically, the investigation provides a case study of uOttawa.

The activities and outcomes associated with the initiatives in the ecosystem can vary widely from being a community-based effort to focusing on attracting entrepreneurial activity to a region around a particular industry (Bell-Masterson & Stangler, 2015). The density, fluidity, connectivity and diversity associated with ecosystems is considered necessary to foster and sustain their vibrancy (Bell-Masterson & Stangler, 2015). The process of developing an enabling ecosystem for entrepreneurial events has received considerable attention from governments, agencies, venture capitalists, and business development consultants. For example, organizations such as the Organization for Economic Co-operation and Development (OECD), the World Bank, and the World Economic Forum (WEF) have developed comprehensive tools, in some cases defining eco-factors required for a successful ecosystem (Nicotra et al., 2018). Interest in entrepreneurial environments has grown in recent years, drawing together many streams of study (Acs et al., 2017). This development is largely the product of policymakers aiming to foster more creative and dynamic cultures to fuel today's innovative market (Motoyama & Watkins, 2014). While interest increases and practitioners attempt to combine elements perceived important to promote entrepreneurial activity, it is necessary to note that an argument exists suggesting research lags behind implementation, resulting in insufficient evidence-based practice (Stam, 2014). This is because the field lacks conceptual frameworks for exploring the cause and effect of entrepreneurial ecosystems and their components (Borissenko & Boschma, 2017). For clarity, this current case study does not set out to examine cause and effect relationships and focuses on actors' perceptions towards capability development in the uOttawa.

More recent efforts were made to build metrics for national entrepreneurial environments (Bell-Masterson & Stangler, 2015; Sheriff & Muffatto, 2018) to direct groups involved in entrepreneurship and impact measurement. Bell-Masterson & Stangler (2015) have

introduced performance metrics to measure entrepreneurial vibrancy. They provide four key metrics for the ecosystem: scale, fluidity, accessibility and diversity. Strangler and Bell-Masterson recommended measurement of universities' entrepreneurship education as a primary data source for entrepreneurship development, taking place over time. It is now useful to discuss university entrepreneurial ecosystems in more depth.

## **2.7 University Entrepreneurial Ecosystems**

Linking with the previous section, universities play a significant role in implementing innovative technologies and fulfilling the human resource needs of their regions. More broadly, institutions have increased participation in diverse networks to promote technology commercialization and entrepreneurship education (Belitski & Heron, 2017). Stam (2014, p. 41) defined the university entrepreneurial ecosystem as *"an interdependent set of actors that is governed in such a way that it enables entrepreneurial action"*. Acs et al. (2017, p. 289) defined university entrepreneurship ecosystems as *"a dynamic institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations by individuals which drives the allocation of resources through the creation and operation of new ventures"*. The university ecosystem acts as a facilitating base for the development of capabilities to support the entrepreneurial activity among student entrepreneurs.

In recent years, universities recognized the value of their contribution to society's economic development in which they can not only create wealth for societies but also generate more funding for research and education (Chai & Shih, 2016; Guerrero et al., 2015). However, research on this topic is relatively limited, especially in emerging and developing economies (Kantis et al., 2012; Sheriff & Muffatto, 2018). As part of an innovation system, a need exists to add value to the university, industry and government (triple helix) by generating

tangible, returns from their research (Chai & Shih, 2016; Hong, 2008). Capability development of entrepreneurs enables universities to orchestrate their activities to generate superior benefits. It also helps them maintain their leadership in innovation-based competitive environments (Lamine, 2017; Leih & Teece, 2016). Although this current study employs a capabilities lens as part of the broader resource-based view, from an institutional perspective, universities are heterogeneous in terms of respective actors' perceptions, results and priorities (Guerrero et al., 2015). Indeed, courses and associated infrastructures vary; hence, there is potentially only so much that is achievable in typically 12 weeks of duration and with some being lecture based and others experiential or action based such as enacting a lean start-up approach (Rasmussen & Sørheim, 2006; Rae, 2012; Mansoori, 2017). However, universities align their finances with their goals, justifying a capability-based approach (Leih & Teece, 2016). The context of technologically oriented start-ups follows.

## **2.8 Context of Technologically Oriented Start-ups**

It is now important to turn to a specific consideration of technologically oriented start-ups that arise from certain ecosystems and might offer benefits from students' ventures to support the goals of universities. Such start-ups are often seen as engines of economic development and as effective vehicles for job creation (Adelino et al., 2017; Hathaway, 2013). The entrepreneurial environment affects the type of start-ups created by entrepreneurs who recognize market opportunities (Stam, 2014) and their growth rate (Mason & Brown, 2017). Evidence indicates that high-potential businesses with a well-defined management framework invested in R&D are at the core of the entrepreneurial ecosystem (Bosma & Stam, 2012; Mason & Brown, 2017; Stam, 2014). In many cases, such firms must adapt and fine-tune their business models, through flexibility (Bock et al., 2012; Crick et al., 2019), experimentation (Andries & Debackere, 2014) and the use of trial-and-error methods (Byrne

et al., 2016; Chesbrough, 2010). Indeed, as mentioned earlier, some technologically oriented firms operate in niche markets and need to employ an internationalized business model to exploit windows of opportunity (Crick & Spence, 2005; Spence & Crick, 2006).

Linking with the prior section, the notion of the entrepreneurial environment in facilitating such activities has evolved since its introduction and has been studied from different perspectives (Coduras & Autio, 2013). For example, Belitski & Heron (2017) describe an entrepreneurial ecosystem as the interaction between organizational, institutional, and systemic factors that influence the identification and exploitation of business opportunities. As such, there is a link between capabilities and performance-enhancement from a resource-based view (as per Barney, 1991; 2018), alongside environmental issues from an institutional view (whereby this current study focuses on the former). Nevertheless, certain authors adopt a systemic approach and describe entrepreneurship systems as communities of interdependent performers in specific social, economic, informational, political, and environmental contexts (Autio & Levie, 2017; Belz & Binder, 2017), while Belitski & Heron (2017) focused on the main relationship between context and individual decision-making based on personal attitudes and context perception. For this reason, the study of capability development in this current study focuses on a single institutional setting, namely, the uOttawa.

In fact, entrepreneurs must analyse contextual factors to identify new business opportunities (Autio & Levie, 2017) and in this current investigation the focus is on technologically oriented student start-up firms. A favourable context features one allowing the identification of business opportunities and the creation of new ventures, which will ultimately increase local entrepreneurial activity. This way, the entrepreneurial ecosystem contributes to organizational growth (Martínez-Fierro et al., 2020). It is therefore important for entrepreneurs

to maximize the potential of an entrepreneurial climate (Wiklund & Shepherd, 2013). These companies are known as high-growth firms (Acs et al., 2017) and these are often technologically oriented in nature. Research has evidenced that high growth entrepreneurship is a complex phenomenon resulting from institutional interactions (Guerrero et al., 2015). The high growth entrepreneurial firms are the most dynamic sector of the economy (Acs & Mueller, 2008) and are generally related to technologically oriented sectors (Dwyer & Kotey, 2016); hence consistent with the contextual focus of this current study.

The business model is the point of convergence regarding literature at the marketing/entrepreneurship interface and not least in respect of the notions of value creation and customer segments (Balocco et al., 2019; Zhao et al., 2005). Various frameworks exist whereby capability development regarding key facets is common in educational programs (as per Osterwalder & Pigneur, 2010; Gassmann et al., 2014). An evolving business model has the ability to formalize strategic assumptions and tell a story that puts to gather the factors underpinning venture creation and development to enable alignment of the value and goals (Balocco et al., 2019; Lackéus & Middleton, 2015). Start-up strategy research commonly explored the types of strategy by content characteristics, analysis of strategy types, and process characteristics relevant to how the strategy is formulated and implemented (Rauch & Frese, 2000).

Business model canvases have been widely used for the purpose of presentation (pitching) and evaluation of business models of start-ups (Carvalho et al., 2020). Business incubators are replacing the (traditional) Business Plan (BP) with business model canvases, since the latter encourages the entrepreneur to conceptualize the venture as an interrelated set of strategic choices (Carvalho et al., 2020). Business models plays a vital role in validation of

the start-up through the networks available through the entrepreneurial ecosystem (Belitski & Heron, 2017; Lamine, 2017). Following the coexistence of new ventures, small and medium-sized as well as large businesses (Jena, 2020), universities and research institutions (Law & Breznik, 2017), agglomerations or networks (Lamine, 2017), entrepreneurial ecosystems enable networks among a variety of actors. However, they must be controlled and coordinated to promote efficient information flows, technology transfer, and processes of value creation within the entrepreneurial ecosystems (Carvalho et al., 2020).

Innovation in respect of an entrepreneurial idea happens while generating and evolving the business model canvas (Belitski & Heron, 2017; Haase & Lautenschläger, 2011). The nine facets of the canvas (as per Osterwalder & Pigneur, 2010) branch out to the most important requirements to operate and validate a business model (Hathaway, 2013). The branches associated with the facets of the business model canvas include (a) key partners, (b) key resources, (c) key activities, (d) value proposition (e) relationship (f) channels (g) customer segmentation (h) cost structure (i) revenue streams. Start-up firms are required to experience and master the different required capabilities that are associated with the operation and relationships of their business (Herhausen et al., 2020; Jena, 2020). The required capabilities for an entrepreneur and the start-up firm are closely associated with the facets of the business model (Balocco et al., 2019). While business modelling is seen as an important capability for becoming an entrepreneur (Jena, 2020), it is important for an entrepreneur to develop capabilities associated with business modelling (Crispin et al., 2016; Lackéus & Middleton, 2015). As such, it follows validation of a business model may serve as an example of a threshold capability consistent with broader entrepreneurial marketing behaviour (see Morris et al., 2002).

## **2.9 Summary**

From the underpinning literature, it is evident that capability development is important to pursue entrepreneurial behaviour and not least among student start-ups. There are various factors affecting capability development pertinent to the role of entrepreneurial ecosystems. In reality, while dynamic capabilities are preferable, certain students may gain threshold capabilities, for example, an ability to validate a business model. However, capability development of threshold capabilities remain relatively under researched among entrepreneurial ecosystems. The next chapter discusses the research methods adopted for this study to address the research questions.

## **CHAPTER 3. METHODOLOGY**

### **3.1 Introduction**

The last chapter provided a review of the literature underpinning this study. This chapter describes the mixed methods research design of this case study featuring uOttawa, including consideration of the analytical approach undertaken with respect to the data in addressing the research objective.

### **3.2 Mixed Methods Case Study**

A body of knowledge exists criticizing what researchers claim is a ‘case study’ approach (Beverland & Lindgreen, 2010; Piekkaria et al., 2010; Welch et al., 2011; Ji et al., 2019). In particular, a criticism involves certain existing studies not providing a ‘thickness’ of data to justify categorization as a case study. To address such concerns, this current exploratory study adopted a mixed methods research design to investigate capability development and barriers for student entrepreneurs within uOttawa’s entrepreneurial ecosystem; that is, to help create and grow their start-up. Nevertheless, an entrepreneurial ecosystem typically evolves (Martínez-Fierro et al., 2020). Furthermore, choice of research design is an important consideration in understanding the development of dynamic and transitioning processes (as per Yoshikawa et al., 2008). Nevertheless, for clarity, the term ‘process’ suggests measurement over a start and end point to measure that process. This current exploratory study recognized that ecosystems evolve and hence students and facilitators may learn over time (for example, reflected in the content different programs, etc.), but a longitudinal study was not possible in this investigation. As such, this case study in the context of uOttawa does not claim to undertake process-based research, but rather a mixed methods approach reflects an exploratory study of perceptions towards capability among key ‘actors’ within the ecosystem in 2020.

However, as Welch et al. (2011) point out, various authors such as Eisenhardt (1989), Stake (1995) and Yin (2002) have written about the case study approach with their own philosophical perspectives. For clarity, this current study adopted the instrumental case study approach of Stake (1995) whereby ‘actors’ (students and facilitators) together with secondary data where possible featured in the context of uOttawa’s ecosystem. An instrumental case study essentially involves the study of a case (in this context an organization) in order to provide insight into a particular issue, redraw generalizations, or build theory. Specifically, in the context of the objectives of this current investigation, to provide insight into a particular issue (related to capability development).

The uOttawa is appropriate for this exploratory investigation due to the heterogeneity of Canadian institutions’ entrepreneurial ecosystems and hence making the research manageable at ‘Masters Level’. In other words, as the final chapter outlines, it provides an avenue for future research to build on these findings. Use of the mixed methods research design helped understand and explain participant meaning (as per Morrow & Smith, 2000) and explore a social or human problem (see Creswell & Poth 2018). It allowed the current study to identify students’ and other stakeholders’ (within the university) views on capability development in accordance with the research propositions stated earlier. During the time of COVID-19 with the lockdowns, self-isolations and start-up businesses being affected, interviewees’ interest for research interviews were very low, hence to improve and deepen the understanding of the ecosystem a survey was designed. Surveys are helpful when the participants have opinion-based questions (Dillman & Christian, 2005).

Therefore, following ethics approval, semi-structured interviews took place in 2020 with 10 student entrepreneurs together with five facilitators. Interviewees were purposefully

diverse and involved students that completed a new venture creation course and had experience with a start-up. Selection was important in order that establishing their perceptions was possible concerning capability development with respect to business model validation as a minimum; that is, among other potential entrepreneurial marketing capabilities. The facilitators involved four faculty members that teach entrepreneurship and a member of the uOttawa Entrepreneurship Hub (3 male and 2 female). The researcher asked respective interviewees to provide relevant secondary data and this varied among those interviewed with some information viewed as confidential. A key facet of this study involved the employment of interviews as this “provides a framework in which the practices and standards be not only recorded, but also achieved, challenged and as well as reinforced” (Oakley, 1998, p.707). Although recognition of a point of arrival at ‘theoretical saturation’ is often difficult within the data collection stage (see, for example, Beverland & Lindgreen, 2010), diseconomies of gathering new information became apparent. Nevertheless, consistent with the thickness of data associated with a case study, further action (data collection) followed and not to generalize to a broader population, but rather to develop an in-depth exploratory study of a central phenomenon (as per Creswell & Poth, 2018).

More specifically, semi-structured interviews allowed the use of probes, designed to tease out depth of information such as to identify the required capabilities and the barriers in the ecosystem. Interviews helped in the development of quantitative survey questions sent to students that completed their studies of the new venture creation course in the Fall semester of 2020. Utilization of this survey stage took place as a secondary source of data collection to get a deeper understanding of capabilities and opportunities. Hence, this case study used a mixed methods approach consisting of both qualitative and quantitative approaches to facilitate a ‘thickness’ of data (see, for example, Stake, 1995).

### 3.3 Data Collection

As previously alluded to, the participants of this study involved a sample of key ‘actors’ within the entrepreneurial ecosystem namely student entrepreneurs and facilitators in uOttawa (professors teaching entrepreneurship and a member of the Entrepreneurship Hub). However, the effects of COVID-19 had implications such as potential interviewees being busy and turning down requests for an interview; also, this took place observing social distancing. Indeed, use of an on-line platform was not ideal to develop rapport with the interviewees. In order to explore the experiences and views of the participants, a snowball sampling strategy took place to identify student entrepreneurs for interviews. The initial sampling approach commenced via utilization of known sources like professors together with a facilitator in the uOttawa Entrepreneurship Hub since they would be “*knowledgeable informants*”(as per Lincoln & Guba, 1985, p.234). Data saturation occurred after interviewing five facilitators. Moreover, it was essential to gather and analyse experiences of people who actually benefit from the ecosystem, namely, student entrepreneurs. As such, undertaking interviews with a variety of actors and collection of secondary data (where possible) served the purpose of ‘triangulation (as per Farquhar et al., 2020). The interview protocol template for student entrepreneurs follows in Appendix 1. A template for facilitators is not contained in Appendix 1 as the core purpose was to establish their perceptions concerning capability development and the role of the ecosystem (what capabilities, how this took place, etc.); also, to obtain potential sampling frames of student entrepreneurs and appropriate secondary data. Before starting each interview, the respective interviewee received an oral explanation regarding the purpose of the study and key terms like capabilities and ecosystems. A request featured non-confidential, appropriate secondary data deemed relevant for triangulation purposes. The data collection ended when a point of theoretical saturation reached (diseconomies in collecting new information).

Quantitative questions at the survey phase were limited only to student entrepreneurs. The surveys responses (57 in total) in late 2020 were anonymous and no collection of personal information of participants occurred as per Ethics Committee guidelines. Facilitators shared the on-line survey link with the groups of student entrepreneurs (namely, the identified potential participants). The survey questions for the student entrepreneurs follow in Appendix 2. However, a key issue is that Ethics Committee approval rested on facilitators sharing the previously mentioned on-line link and so calculating a response rate was not possible. This was by no means ideal, but given the problems associated with obtaining Ethics Committee approval, the researcher had to manage the situation concerning data collection made even more difficult by circumstances surrounding COVID-19. Based on the preliminary interview codes, the survey questionnaire containing 16 questions features in Appendix 2. The participants had an option to contribute to study by participating in an interview if they gave consent; moreover, provision of informed consent via a consent form featured as a survey-link. Appendix 3 contains the consent form for interviews and Appendix 4 contains the informed consent form for surveys.

### **3.4 Role of the Researcher**

Returning to the qualitative research stage, recognition existed that the researcher brings to the investigation their own context and identity that should be viewed as his or her bias (Creswell & Poth, 2018). To minimize any personal bias on the results of this study, member checks took place during and after interviews to improve ‘trustworthiness’ (see Morrow, 2005). Not least, in respect of the credibility, validity, and transferability of the study results (Lincoln & Guba, 1985). For example, the researcher often restated and summarised information during each interview, asking participants about the accuracy of the information.

Furthermore, the researcher requested each participant to review the content of his or her transcript for validity after transcribing the recorded interviews. In addition, during the evolution of this study affected by changing circumstances of COVID-19, the researcher consulted various resources and the faculty supervisor. Direction from the supervisor helped the researcher to focus on relevant details that participants offered, which led the researcher to develop themes from the data. Finally, the researcher included examples of relevant quotes from participants to substantiate the findings of the study (Maxwell, 2005).

### **3.5 Data Analysis**

The Data analysis took place in three phases. In phase one, the interviews were digitally recorded and transcribed verbatim manually using a tool called the 'happy scribe'; subsequently, the descriptive coding followed. For the first level of coding, the descriptive coding method was used, assigning labels to data to summarize these in a word or short phrases (Miles & Huberman, 2013). To address the research propositions, the researcher employed appropriate descriptive codes. According to Miles et al. (2013), the descriptive codes eventually provide an inventory of topics for indexing and categorizing, which greatly influenced the researcher to choose a descriptive coding methodology for the first level of coding for this study.

In phase two, the second level of coding identified the pattern and themes from the set of first level codes. Pattern coding, as a second cycle method, is a way of grouping the summaries into a smaller number of categories (Cresswell & Miler, 2000). Additionally, the pattern codes pull together a lot of material from first cycle coding into more meaningful and parsimonious units of analysis (see, Miles & Huberman, 2013). To compare and contrast facilitators' and the students' view, the contact summary forms were used, which were created

after each interview for identifying the similarities and dissimilarities between the views of interviewees. Using the pattern codes, the factors affecting the usability or effectiveness of the resources in the entrepreneurial ecosystem with respect to capabilities and barriers identified by interviewees allowed mapping to take place.

Phase three featured data analysis for the surveys responses. The responses to questions by the survey respondents featured in pivot tables within Microsoft Excel for each question and sorted using the mathematical functions. Conversion of the sorted data occurred into visually representable information such as pie charts and bar charts using a data visualization tool called Tableau. The visually represented data processed with the surveys responses in displayed and discussed in the following chapter.

### **3.6 Robustness of Data**

As previously alluded to, it was difficult to undertake robustness checks on the quantitative data. Denscombe (2002) emphasized two main questions featuring in social science research: (1) Are the data valid? (2) Are the methods reliable? For example, in the quantitative phase, problems included examining reliability and validity due to the limited sample size and the types of questions asked, together with the Ethics Committee not allowing the researcher to obtain a sampling frame and instead relying on professors to ask student entrepreneurs to click on a weblink. Turning to the qualitative data, researchers utilize various validation strategies to make their studies credible and rigorous (Cresswell & Miler, 2000). To summarize points considered earlier in this chapter, credibility of this study was achieved by using the validation strategies of triangulation and peer debriefing (Cresswell & Miler, 2000; Lincoln & Guba, 1985). To increase the reliability, the researcher constantly undertook

triangulation of the student data with that made available through the facilitators in the entrepreneurial ecosystem and constant member checks occurred.

### **3.7 Summary**

This chapter presented the procedures and methods used in this case study of uOttawa. This study featured a mixed methodology (qualitative and quantitative) and considered approaches taken to facilitate robustness in data collection. The following chapter presents the research findings of the study.

## **CHAPTER 4. RESULTS**

### **4.1 Introduction**

Chapter 3 presented the methods adopted for this case study in the context of uOttawa. Chapter 4 presents the mixed methods research findings arising from this study. In accordance with the research objectives outlined in Chapter 1, the purpose was to understand the key entrepreneurial capability development opportunities for student entrepreneurs available in the uOttawa's entrepreneurial ecosystem and the potential barriers for entrepreneurial growth. More specifically, the data arising from respective participants provided unique insights regarding the research questions posed in this study that are worth repeating below for clarity.

1. What are the capabilities student entrepreneurs developing their start-ups need to achieve to help make their firms sustainable?
2. How does the uOttawa's entrepreneurial ecosystem support the students in respect of obtaining the capabilities needed to facilitate the sustainability of their start-up firm?
3. What are the barriers faced by students in uOttawa entrepreneurial ecosystem in respect of obtaining the capabilities needed to facilitate the sustainability of their start-up firm?

### **4.2 Background Data**

Preliminary interviews took place with five facilitators (4 professors and a member of the Entrepreneurship Hub; that is, 3 male and 2 female) within the uOttawa's entrepreneurial ecosystem for the purpose of triangulation of the primary data collected through interviews. The facilitators interviewed shared information about various clubs, events and programs in the uOttawa entrepreneurial ecosystem to support start-ups and key issues feature in Table 1. This is in addition to taught entrepreneurship courses ranging from new venture creation through to transformation in business models among existing firms (see the uOttawa course catalogue for respective courses across faculties especially the Telfer School of Management).

Moreover, the facilitators shared insights to explain certain perceptions of student entrepreneurs and likewise issues they did not consider useful to investigate. One specific illustration is that the interviews with facilitators did not indicate the gender of students to be an issue of importance and rather their attitude/commitment irrespective of gender was more important. To avoid repetition these follow in respective sub-sections later in this chapter.

<b>Summary of key activities in uOttawa's entrepreneurial ecosystem</b>	
<b>Title</b>	<b>Description</b>
<b>Clubs</b>	
Enactus uOttawa	Enactus is a global non-profit with chapters in countries across the globe that aims to empower students to use entrepreneurial action to create a better world.
Software Engineering Student Association	The Computer Science Student Association (CSSA) of uOttawa, provided by this Constitution an organization dedicated to the pursuit of obtaining and managing resources for all members of the undergraduate Computer Science community at uOttawa.
The Entrepreneurship Club	The Entrepreneurs' Club at the Telfer School of Management is a not-profit student-run organization. The club devotes time to organizing professional networking events to link students from the Telfer School of Management and uOttawa with the business

	community while keeping the entrepreneurial theme in mind.
<b>Competitions</b>	
Desjardins Social Innovation Pitch Competition	The Ventures Initiative and Desjardins Entrepreneurial Initiative Fund provides students who are running a social enterprise, social venture or project that is affecting the community with money to move their initiative forward.
Entrepreneurial Idea	The objective of the competition is to raise awareness and interest in entrepreneurship among engineering and computer science students both at the undergraduate and graduate levels.
Entrepreneurship Concepts	The Entrepreneurship Concepts competition allows students to present their innovative business plans to a panel of judges from the Ottawa community. Students are required to prepare a business plan with the support and guidance of experts. Then, they present their plan for the chance to win \$5,000 for first place, \$3,000 for second place and \$2,000 for third place.
Elevator Pitch Competition	The Elevator Pitch Competition is a start-up event that showcases the uOttawa's youngest

	<p>and sharpest entrepreneurs to compete against one another for prize money of up to \$35 000.</p> <p>The competition is divided into 2 categories; validation and Traction.</p>
BMO Boost Fund	<p>The BMO Boost Fund, provided by BMO Bank of Montreal, supports Start-up Garage companies achieve their next milestone.</p>
uOttawa top 5 Start-ups	<p>The uOttawa invites students who have created start-up ventures to participate in a competition that will result in up to five companies being selected for an exclusive trip to Silicon Valley in the spring. Each selected start-up will receive \$4,000 (CAD) in financial support for the trip.</p>
<b>Events</b>	
Business Dinner	<p>The annual ‘Toast to Success’ Business Dinner, is the largest professional networking event hosted by a student-run organization at the Telfer School of Management. This flagship event celebrates entrepreneurial success within the uOttawa and the local business community to inspire like-minded students and professionals. Dynamic networking, a gourmet three-course meal, charitable silent auction, and a high-profile Canadian keynote speaker has made Business Dinner a prestigious event.</p>

<p>ELLE Gala</p>	<p>This unique event recognizes and celebrates the work of women entrepreneurs and leaders in business and females who are fighting to shatter the glass ceiling. ELLE – Excellence in Leadership, Legacy in Entrepreneurship is an event that brings local and national women leaders to the uOttawa. The evening consists of a keynote speaker, business profiles and a mentor hour, allowing students to connect with professional entrepreneurs and student entrepreneurs as well as bringing awareness of the opportunities that are available to them.</p>
<p>Entrepreneurship Bridges</p>	<p>Entrepreneurship Bridges is a series of free events that promote entrepreneurship, provide start up and new venture advice and access to a community of entrepreneurs. The program is a joint initiative between the uOttawa’s Entrepreneurship Hub, the Faculty of Engineering, Start-up Garage, the Entrepreneur’s Club and the Telfer School of Management.</p>
<p>Global Entrepreneurship Week</p>	<p>Global Entrepreneurship Week, the world’s largest celebration of the innovators and job creators, who launch start-ups that bring ideas</p>

	to life, drive economic growth and expand human welfare.
Legacy Conference	The Legacy Canada Conference is an event built for Canada's young creators.
Start-up Social	Anyone is welcome to pitch either their idea or themselves, looking for feedback, mentorship, customers or co-founders!
<b>Programs</b>	
Maker Launch	The program propels start-ups to success by surrounding them with the team, facilities and tools needed to launch and scale.
Bio-Garage	Bio-Garage is a hub for students from all disciplines to gain experiential learning in building, reconfiguring and combining DNA and proteins, the building blocks of life.
Simon Nehme Summer Entrepreneurship School	The school offers skill development sessions and hands-on workshops delivered by experts, entrepreneurs, and members of the entrepreneurial community as well as academia.
Start-up Garage	Start-up Garage is a 4-month pre-accelerator program led by the uOttawa's Entrepreneurship Hub to foster and support entrepreneurship.
Hot Desk Program	The hot-desk program provides current students at the uOttawa with desk space for 15

	<p>hours a week or less at the new eHub in the STEM Complex. Through mentors, entrepreneurs in residence and working space, the goal is to support students achieve their next milestone.</p>
<p>Build Your Own Career Bootcamp</p>	<p>The Build Your Own Career Bootcamp is a full-day workshop that provides resources and education support to students who are looking to run their own business. This program helps "Solopreneurs" understand the basics of running their business, how to deliver value to customers, and inexpensive and practical tools to get their business online.</p>
<p>Innovation Support Services</p>	<p>Innovation Support Services mission is to advance research at uOttawa for societal benefit and impact through student experiential learning and the promotion of partnerships with industry, government, the community and other stakeholders.</p>

*Table 1: List of entrepreneurship promoting activities in the uOttawa entrepreneurial ecosystem. (Source: Information from interviews and documentation shared by facilitators).*

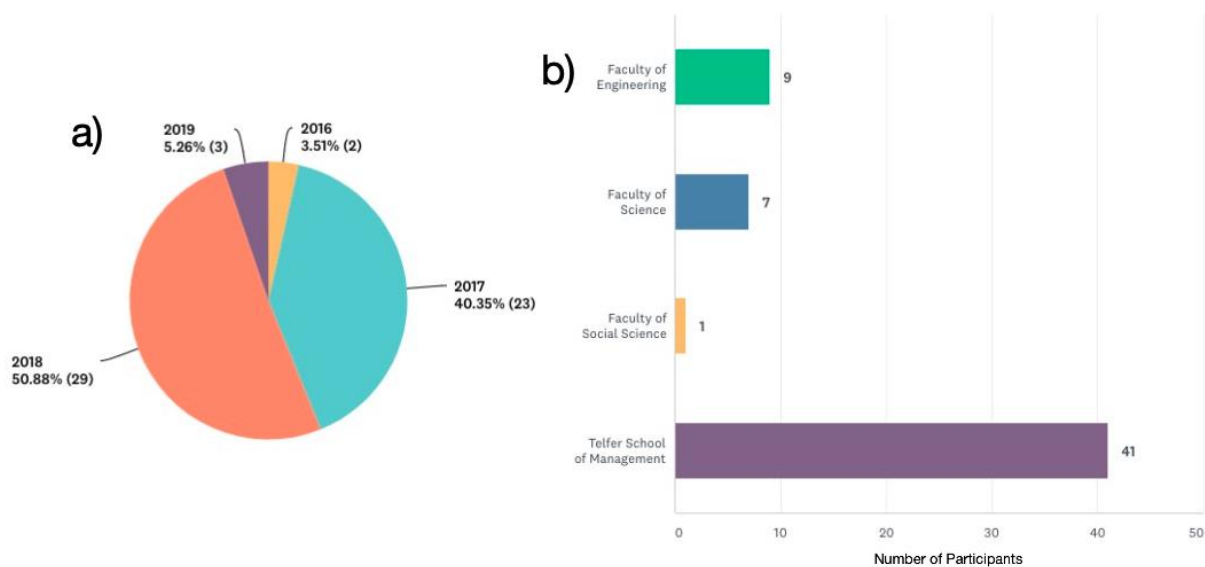
### 4.3 Demographics of Student Participants

As Chapter 3 outlined, results from student entrepreneurs in this case study of uOttawa featured first, survey responses from 57 students and second, 10 interviewees who completed the uOttawa's entrepreneurship foundry and/or new venture creation courses. For clarity, the student entrepreneurs in this case study involved those at different stages in their process of venture creation. Some participants were involved with developing and validating their concept while other participants were developing their prototype or moving their business forward. As such, the term 'student entrepreneur' represented participants exhibiting different experiences with respect to capability development and the entrepreneurial ecosystem. At a minimum, this included exposure to business modelling activities, writing business plans and presentation pitches (to represent analytical and soft skills from the previously mentioned courses).

Starting with the core quantitative data, Table 2 indicates these joined the university during different years varying from 2016 to 2018 with a majority of participants starting in 2017 or 2018. The results show that they have spent at least a year in the university (and the entrepreneurial ecosystem), having time to experience capability development opportunities and not least via taught courses such as New Venture Creation. The majority of the participants' degree program was registered in the "Telfer school of Management" while some participants' degrees were registered in the Faculty of Engineering, Science or Social Science.

This indicated that findings were not restricted to Telfer students providing prima facie evidence that the data featured perceptions towards entrepreneurial capabilities and the broader entrepreneurial ecosystem as opposed to simply one faculty. Indeed, the 10 interviews also featured students from across the uOttawa. However, due to Ethics Committee guidelines in ensuring anonymity, further details about the student entrepreneurs participating in the

interviews does not follow. Specifically, because providing characteristics like age, faculty, product type, and so on would violate Ethics Committee guidelines vis-à-vis students' identities (it would be evident who they were to anyone deeply involved in entrepreneurial facilitation); alternatively, disguising their background details would serve little purpose. Comments from the anonymous interviewees follow in a later section to add insights supplementing the survey responses from students.



*Table 2: a) The year the participants enrolled in uOttawa; b) Number of participants from different faculties of uOttawa.*

#### 4.4 Core Research Results

As previously alluded to, for the purpose of clarity, division of the core research results (quantitative and qualitative findings) feature in two separate sections. Respective, graphs and diagrams provide a visual/numerical representation of the survey responses provided by those participating in the survey. The subsequent qualitative findings feature in particular subsections in alignment with the pattern codes obtained from the analysis of the interviews.

### 4.4.1 Capabilities

To understand participants' perceptions regarding entrepreneurial capabilities, various questions asked them to rate the importance of various capabilities and their current capability development stage for each of the core issues identified in earlier literature. Additionally, survey questions featured those designed to test their confidence and ability to build a start-up in the uOttawa's entrepreneurial ecosystem (see Table 3).

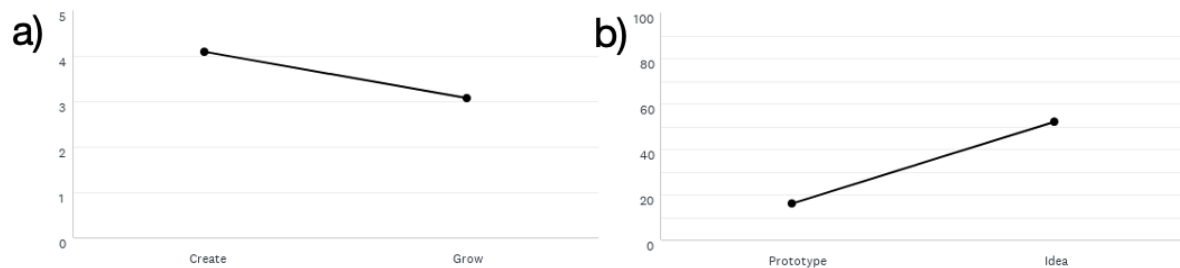
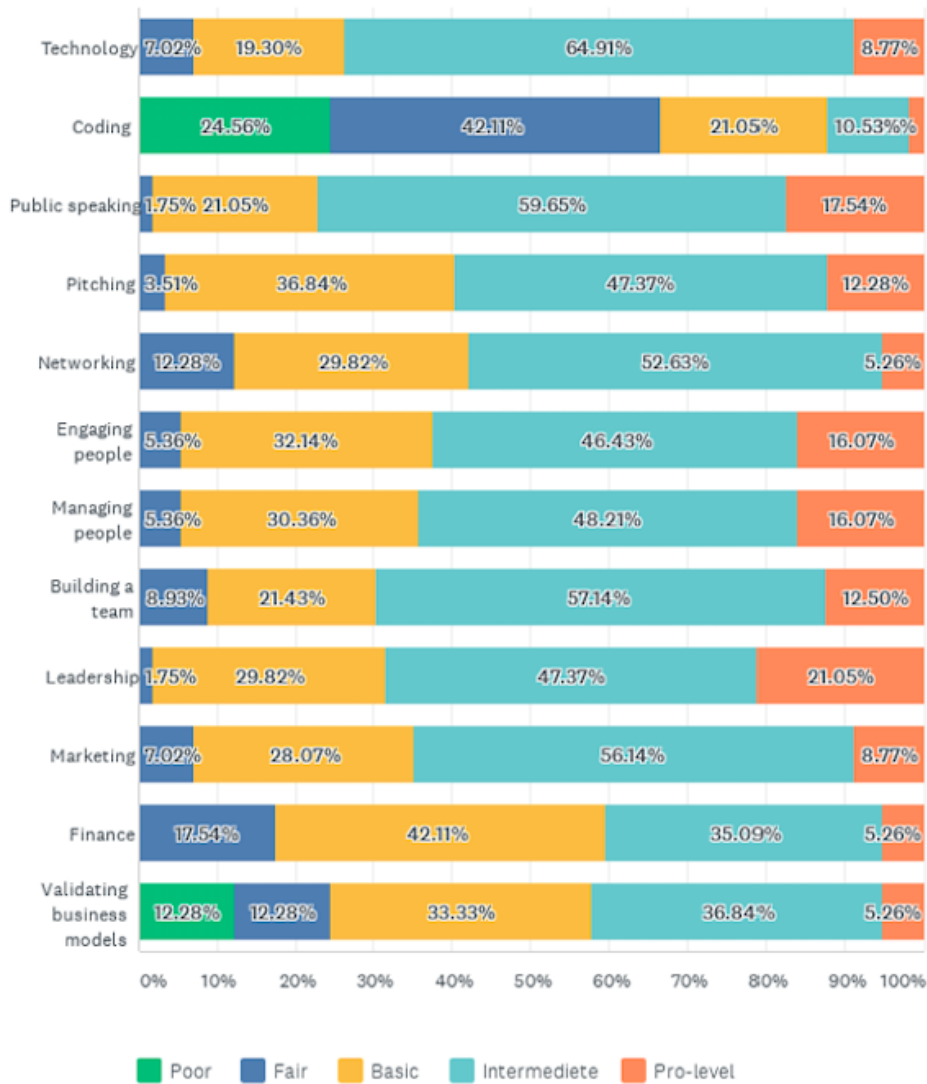


Table 3: a) Average participant answers for an ability to create vs grow their start-up; b) Percent of participants in the prototyping vs ideation stages.

On average, more participants perceived that they could create their start-up in the uOttawa entrepreneurial ecosystem than the number of participants perceiving they could grow their start-up. A potential explanation based on the number of available resources in the uOttawa's entrepreneurial ecosystem highlighted by the facilitators and the Entrepreneurship Hub's website, suggests there are more opportunities such as events and classes for venture creation/start-ups (including gaining initial traction) rather than opportunities focusing on growth/scalability. Another issue mentioned by certain facilitators involved the possibility that not all student entrepreneurs might be growth focused so that may affect perceptions if they wanted to remain small-scale businesses. In contrast, they proceeded to add that remaining

small-scale may not be viable and hence capability development in facilitating a sustainable business model was necessary irrespective of growth objectives. However, discourse also involved the possibility of participants lacking certain capabilities to move up to next level, such as the prototyping stage. Indeed, the participants might not be sure about how to validate their idea. Moreover, there might not be adequate resources in the entrepreneurial ecosystem to build a prototype depending on the nature of the venture; hence, highlighting the importance of network partners that may help. Based on the key capabilities and skills identified by the facilitators, the participants were asked to rate their current skill level in areas such as technology, public speaking, pitching, networking, engaging people, managing people, building a team, leadership, marketing, finance and validating business models (Table 4).



*Table 4: Percent of participant rating their current skill level in the areas.*

The majority of the participants rated either basic or intermediate for all the skills except validating business models and coding. Results concerning validating business models was especially concerning given the importance within courses featuring in the entrepreneurial ecosystem. The facilitators mentioned that in their experience, students vary in respect of capabilities, with some struggling in validating their business models, in some cases, relying on group members' help in classes. However, how that translates to those students attending

classes simply for credits as opposed to other serious about new venture creation was more difficult to appreciate unless student entrepreneurs kept in contact with them.

Returning to the issue of coding, this is one of the most important skills for the development of information technology based start-ups. The facilitators indicated that often hiring of coders takes place as a key resource or network partner within business models so some student entrepreneurs do not personally need these skills. Coding is one of the skills that often takes a considerable amount of time to develop and requires a high level of technical competence. As such, the student entrepreneurs could have skipped coding to focus on developing other necessary skills required to create and grow their start-up. Moreover, they might develop various skills and capabilities including coding over time by learning and practicing while in the university. In contrast, validation of a business model is a key issue required to move a business forward.

Establishing the participants' perceptions towards key capabilities identified in the entrepreneurial marketing literature (and in discussion with facilitators) were via two questions in the survey (as per Table 5). Whether these were threshold as opposed to dynamic capabilities was debatable. Key issues focused on a proactive orientation, being opportunity driven, customer intensive, innovation focused, exhibiting risk management, resource leveraging and involved in value creation. Discussions with facilitators suggested that student entrepreneurs were typically unlikely to have progressed to a stage where they exhibited 'dynamic' as opposed to 'threshold' capabilities as per academic definitions (see Chapter 1). For this reason, this current study therefore focuses on the term 'threshold' capabilities.

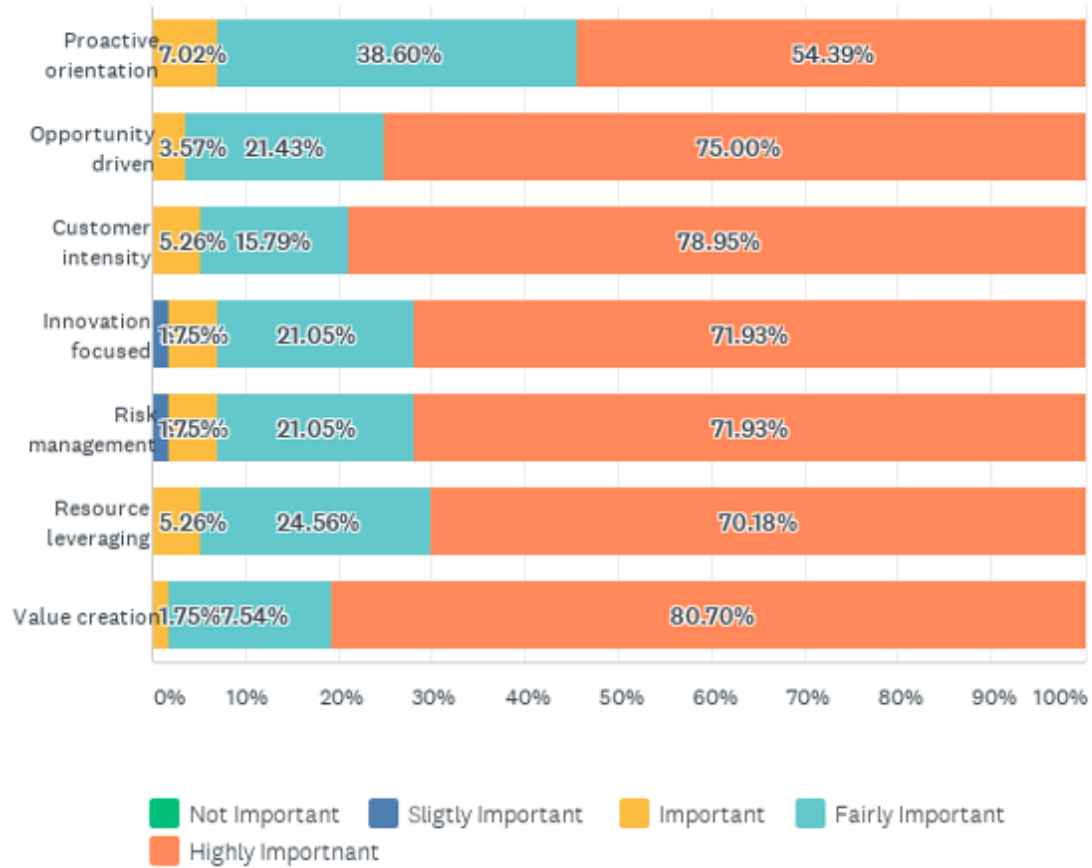
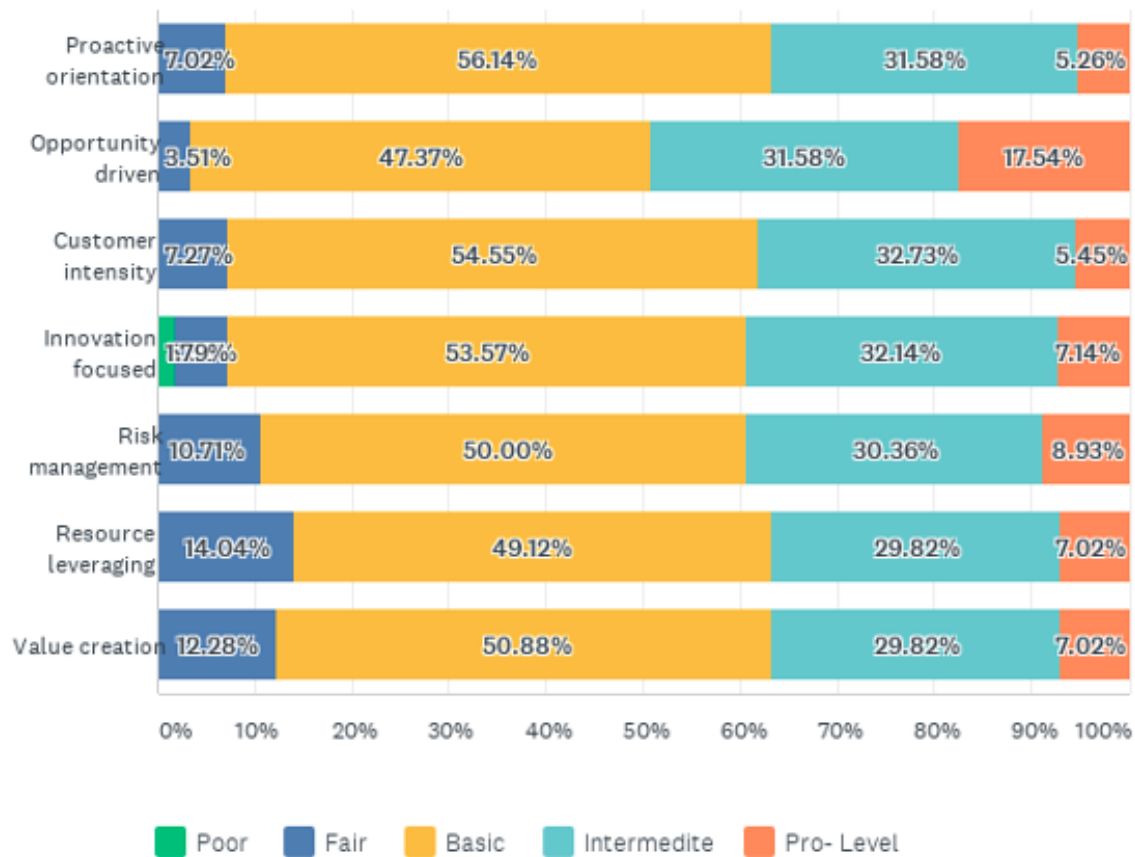


Table 5(a): Percent of participants rating the importance of key capabilities.



*Table 5(b) : Percent of participants rating their current capability level in key capabilities.*

Table 5a suggests in aggregate terms, the participants rated all specified capabilities as highly important for the creation of a start-up. In particular, they perceived value creation and customer intensity (key facets of business models) as important capabilities. According to the results from Table 4(b), entrepreneurs rated their current capability development level for all issues as mainly up to intermediate level. The capability of being opportunity driven has comparatively more number of participants perceiving that they have developed a pro-level capability. Possible reasons for more pro-level opportunity driven participants could result

from student entrepreneurs able to identify but not exploit opportunities. In turn, this raises a concern regarding the uOttawa entrepreneurial ecosystem facilitating particular capabilities.

Returning to an earlier point, namely, based on the demographics of the participants, as previously discussed, they have often spent a reasonable amount of time in the uOttawa's entrepreneurial ecosystem. The facilitators pointed out that student entrepreneurs vary in the extent to which they seek support from facilitators and not least the Entrepreneurship Hub. This proactive behaviour among some student entrepreneurs in comparison to others may help explain their varying capability development in respect of Table 5. Interestingly, drawing on issues already discussed like some students relying on group members for help, the facilitators suggested varying proactive behaviour might help explain the findings regarding Table 6 in respect of capabilities in validating business models. The participants rated between level 1 and 5 (with 5 the highest) the extent they were able to develop capabilities related to the following business model facets: key partners, key resources, key business activities, value proposition, customer relationships, distribution channels, customer segments, revenue streams and cost structure.

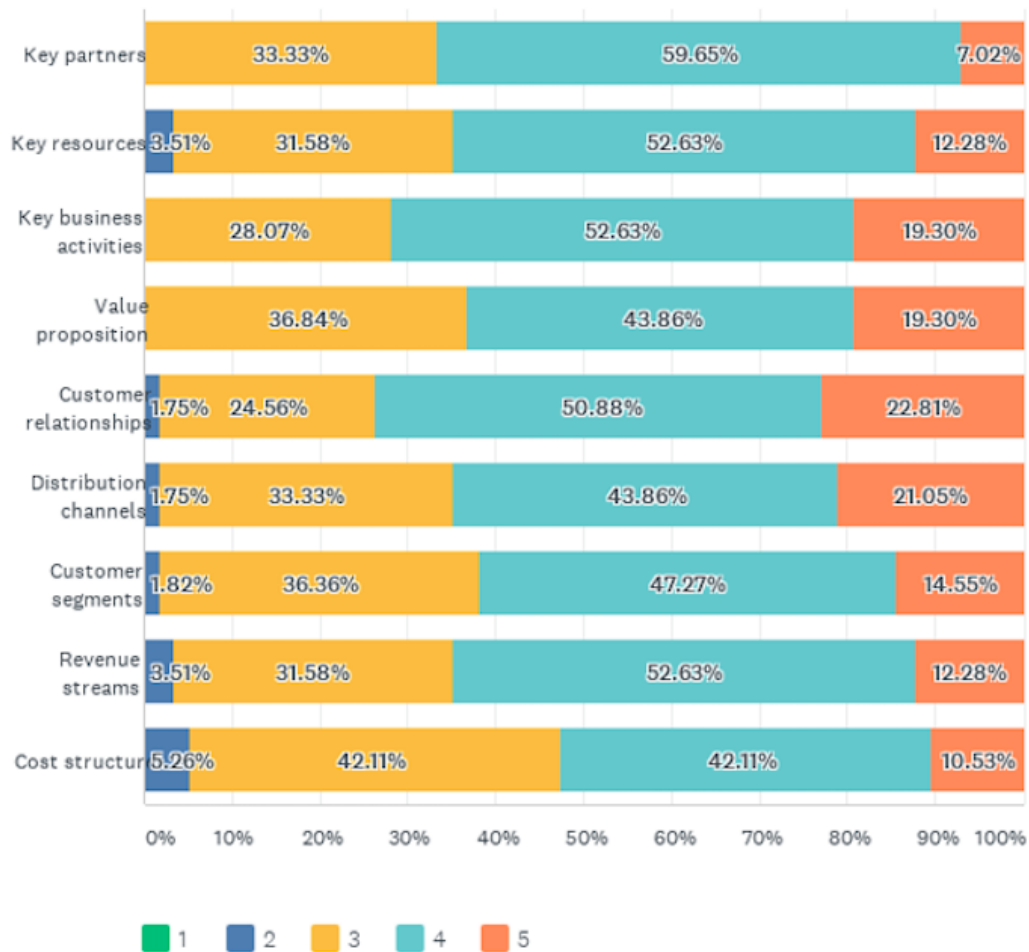


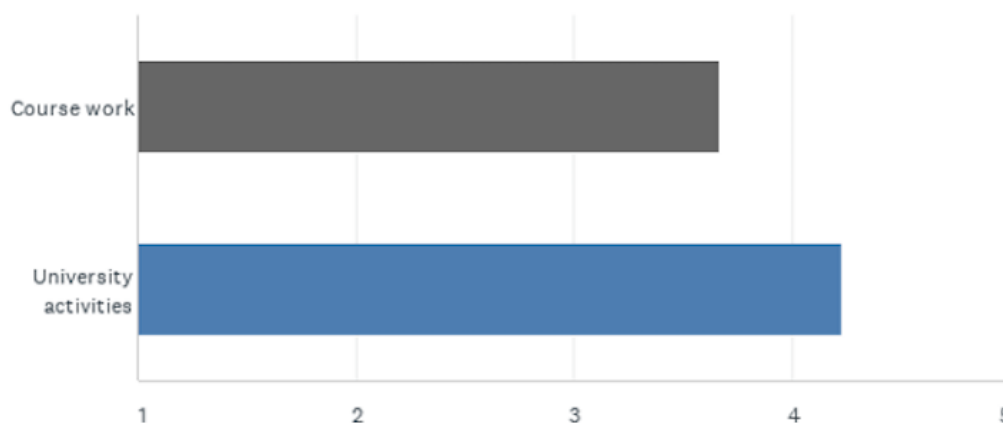
Table 6: Extent of capability development in the areas related to the business model facets (1: not at all to 5 : large extant).

Table 6 suggests in aggregate terms, the participants were typically able to develop a reasonable level of capabilities related to business model facets. Moreover, the participants developed capabilities through various resources available in the uOttawa entrepreneurial ecosystem. That said however, the facilitators raised doubts about whether certain student entrepreneurs were in reality ‘over confident’ in their capabilities. For example, objective data such as a comparison against students’ grades and/or moving forward a start-up would be

interesting, but impossible in this current study due to the Ethics Committee's guidelines regarding maintaining anonymity.

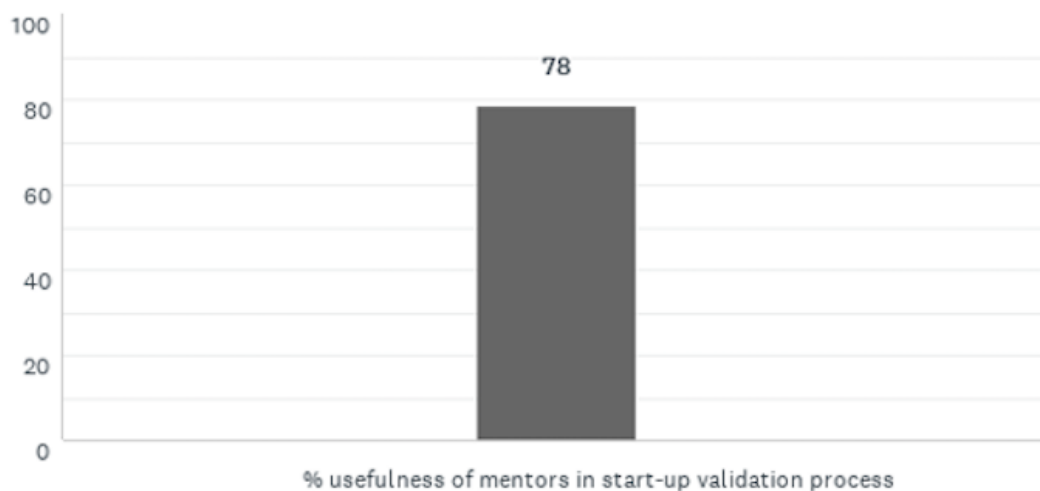
#### 4.4.2 Resources

The participants provided mixed perceptions regarding the usefulness of some of the resources available within the uOttawa entrepreneurial ecosystem. Some of the resources mentioned by the facilitators to enhance capability development involved the courses on offer (not least the coursework such as validating business models), mentors, together with university activities supporting entrepreneurship such as those supported by the Entrepreneurship Hub. The participants comparatively rated the course work and university activities as shown in Table 7. Although broader university activities received a higher rating, certain facilitators noted that certain coursework could be 'generic' and indeed outdated as opposed to 'applied' and 'current' in nature, affecting perceptions. Nevertheless, the overall rating for entrepreneurship coursework was reasonable, while still exhibiting scope for improvement to facilitate development of appropriate capabilities (those perceived as lacking like validating business models as per earlier findings).



*Table 7: Capability development through course work and university activities.*

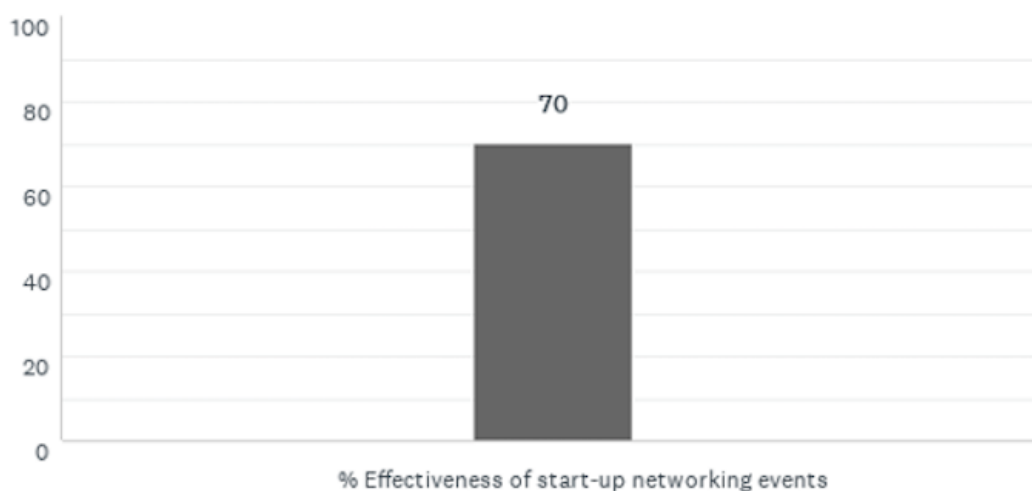
The participants directly rated the usefulness of the mentors available in the uOttawa's entrepreneurial ecosystem in the start-up validation process (Table 8). The 78% perceived usefulness of mentors shows that they typically play a major role in supporting the entrepreneurial ecosystem and are helpful in the capability development of the student entrepreneurs. This question supported the Ethic Committee's guidelines regarding anonymity so an individual student's response was not associated with a named mentor. Even so, a comment from the facilitators noted the possibility that some participants might not have developed their network enough to reach out to the correct/appropriate mentor(s) for help. For example, certain mentors have more experience in certain sectors than their counterparts (together with possessing strong network ties); in fact, some may be technologically oriented (like in the Engineering Faculty) as opposed to business oriented like in Telfer.



*Table 8: Percent usefulness of mentors in the start-up validation process.*

### 4.4.3 Network

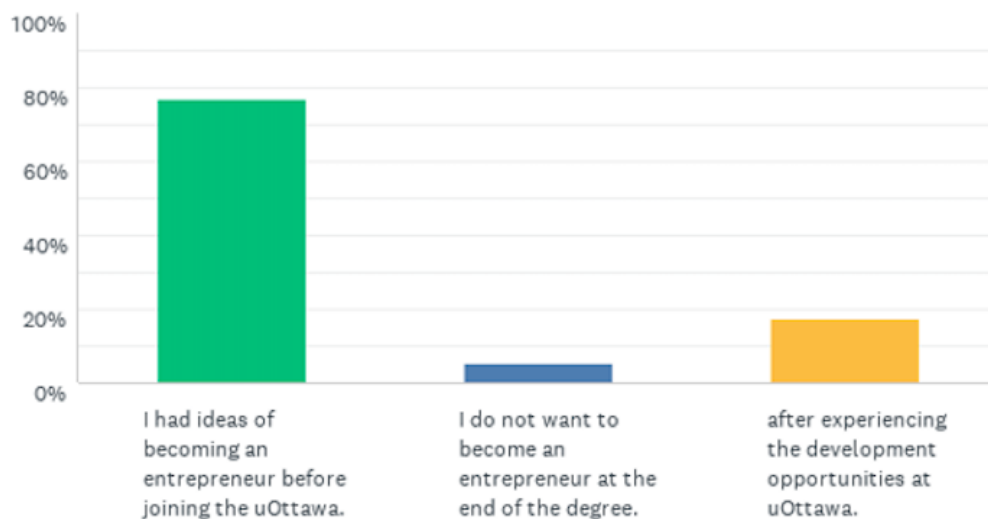
Linking with the prior section involving mentors, the facilitators highlighted the benefits of networking in respect of capability development. In contrast, Table 9 shows the participants rated the effectiveness of the networking events taking place in the uOttawa entrepreneurial ecosystem in aggregate terms at 70%. The facilitators provided insights whereby particular student entrepreneurs network more widely than others; the implication being certain respondents that did not network as much, may not be in a good position to rate the effectiveness of networking events. Those students may need to develop capabilities to enhance their networking capabilities. A recognition existed that the timing of events was sometimes problematic. That said however, facilitators mentioned the importance of the type of events, such as those enabling building relationships with key network partners to overcome capability shortages (intermediaries for sales through to investors for funding and added experience).



*Table 9: Percent effectiveness of start-up networking events.*

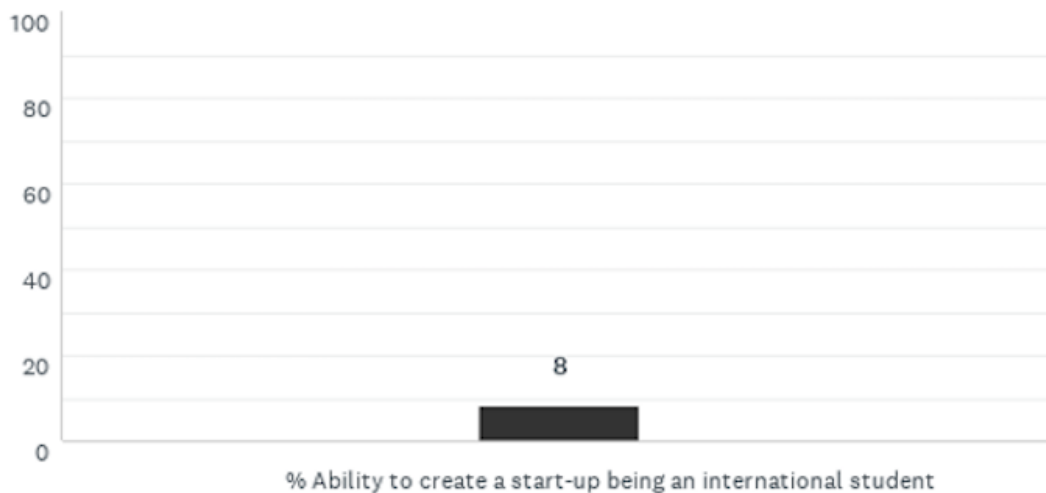
#### 4.4.4 Barriers

The facilitators identified barriers in respect of what the uOttawa’s ecosystem offered vis-à-vis what effort respective student entrepreneurs undertook. For example, a 12-week course could only allow a professor to develop certain capabilities among students in line with learning objectives. This further supported the perception that ‘threshold’ as opposed to ‘dynamic’ capabilities were a likely outcome. In fact, some students were potentially only attending for course credits as opposed to others wanting to develop capabilities, including many wanting to start ventures prior to university and others after an exposure to relevant courses (see Table 10). Consequently, a common ground was an aspiration in not trying to achieve too much (while still meeting learning outcomes), yet at the same time trying to engage students regarding entrepreneurial aspirations.



*Table 10: Entrepreneurial goal of the participants at the end of the course.*

A further barrier discussed with facilitators involved the potential of being an international student. In fact, although a small response rate, Table 11 shows 7 of the 57 survey participants answered the optional question to rate the ability to create a start-up being an international student (demonstrating the perceived difficulty). According to certain facilitators, there are certain immigration laws that restrict the international student entrepreneurs to benefit from the uOttawa's ecosystem, although the upcoming qualitative findings describe in more detail the perceived barriers regarding international students. That is not to say certain Canadian legislation does not restrict their ability to start a firm in another country and hence particular capabilities may be transferable.



*Table 11: Percent ability to create a start-up being an international student.*

## 4.5 Qualitative Findings (Student Entrepreneurs)

Four related patterns emerged from the research data involving the quantitative phase with students and the interviews with facilitators. The major patterns identified from the results involved:

1. Student entrepreneurs' perceptions about **capabilities** and the development opportunities available.
2. **Resources** available to student entrepreneurs' in the uOttawa entrepreneurial ecosystem.
3. The range of **networking** opportunities/events available to student entrepreneurs' in the uOttawa entrepreneurial ecosystem.
4. **Barriers** that student entrepreneurs experience in the process of creating and growing their start-up firm.

Pattern 1 helped answer the first research question; *what are the capabilities student entrepreneurs developing their start-ups need to achieve to help make their firms sustainable?* Patterns 2 and 3 addressed the second research question; *how does the uOttawa's entrepreneurial ecosystem support the students in respect of obtaining the capabilities needed to facilitate the sustainability of their start-up firm?* Theme 4 addressed the third research question; *what are the barriers faced by students in uOttawa's entrepreneurial ecosystem in respect of obtaining the capabilities needed to facilitate the sustainability of their start-up firm?* Findings in respect of the 10 interviews with student entrepreneurs follow and for emphasis, it is worth re-stating that Ethics Committee guidelines did not allow this study to feature characteristics of those interviewees to maintain anonymity, especially since they had an opportunity to comment on professors and university resources including courses.

### 4.5.1 Pattern 1: Capabilities

The interviewees were for the most part consistent in respect of the importance and development of particular capabilities like the ability to validate business models. However, from the outset it is worthwhile stating that although academic discourse as opposed to practitioner discourse featured in the interviews, a recognition existed that developing ‘threshold’ rather than ‘dynamic’ capabilities was likely. To illustrate, interviewees mentioned terms like ‘basic’ or ‘operational’ to represent the function of capabilities getting them to a particular milestone. As a further illustration, other interviewees provided broad statements like ‘traction’ to demonstrate capabilities required to get them passed a point. However, individual interviewees differed in respect of perceptions towards various capabilities and not least based on gaps in knowledge from courses undertaken. The following discourse is not always grammatically correct, but represents the ‘voice’ of interviewees.

One participant especially highlighted the need for capabilities regarding ‘resource management’ as it was termed in validation procedures. *“Resource management would be the most controllable area. What I mean by that is it's let's say we're talking about a client opportunity. There's not much we could do in terms of going out to ask clients about what they think and that is hugely limited on how many clients you talk to, how much effort they put in to gather the feedback in order to make a change in that area. So I would say that's the most actionable aspect of all the areas (capabilities) that you mentioned.”*

Another interviewee concentrated on resource leveraging in a business model. *“I don't think we do either leverage enough or even get those resources from a point of view. Just because we got the resources in the university, well, let's say with the example of mentor 1 from*

*course A, we got to know about the various resources to leverage to grow our start-up, but we think in terms of leveraging. We are not sure how to do it properly yet, we developing on it.”*

Perhaps the main issue focused on developing capabilities related to customer. One interviewee mentioned: *“customer intensive and being innovation focused are the most required capabilities at this point of time. Focusing on innovation to succeed is required not die at the start. But, I also think sometimes it is whole pressure, like building the next big thing that's going to actually disrupt the ecosystem..... I think I talk to enough customers from the beginning and I think a lot of the times I think, oh, this is a great idea and you do a lot of strategizing”*. Another interviewee linked facets of a business model and mentioned that: *“I think customer intensity as a most important capability which makes revenue driven for which we have to be innovation focused. We are pretty rapid in prototyping in terms of getting like a prototype out as soon as you can, getting feedback on that and then improving. The customers validated us based on if we generated revenue as our start-up handled with financial solutions”*.

Although discussion took place of networking in its own right, students discussed the role in business model validation as important, including overcoming some student entrepreneurs' limited capabilities. One interviewee stressed the importance of the ability to network together with understanding technology being the most important capabilities from their own perspective. *“I would say people skills in terms of like networking, you cannot go anywhere in the business world without being able to build a network, but being able to approach people and talk about what you're doing to lots of people when you start a start-up..... I wish I had more technical capabilities to build our website and to understand the in-depth technical aspects of our product... We managed to hire people and get things done which see as a big capability for people starting-up”*.

In short, although the importance of capabilities had similarities, interviewees tended to focus on different ones associated with validating business models. However, in terms of entrepreneurial capabilities more broadly, some interviewees appeared more proactive than others; also, perceptions were influenced by risk management in pursuing opportunities and the stage their venture had reached. One interviewee mentioned that *“risk management might be required when are growing in revenue but at this point of time being a young start-up we are focusing on developing our skills, sustaining and generating revenue”*.

#### **4.5.2 Pattern 2 : Resources**

The interviewees discussed resources they had within the uOttawa ecosystem. The resources focused on: a) course work b) funding opportunities c) mentors d) Entrepreneurship hub.

##### ***Course Work***

The interviewees invariably highlighted that their course work acted as a stepping stone in developing their basic capabilities, but different courses varied in relevance. One highlighted that *“the software engineering program, to be honest, does not help a lot, both for the technical standpoint and entrepreneurial standpoint”*. One student tried to get financial knowledge from a Telfer course to supplement entrepreneurship courses. *“In terms of finance coursework, there's a lot of things that I still applying in my business right now. For example, we had that pitch that I mentioned, in terms of investors, they want to see a financial knowledge and do you know how to forecast revenue for your business”*.

Certain interviewees said that their coursework did not actually help them to create their start-up idea but indirectly the program opened gateways to other resources for them to create

and grow their start-up. One interviewee added “*for our start-up knowledge not directly from my program, but my program opened many other opportunities*”. Another highlighted that course work did not help in building the start-up “*I would say no, I would say I definitely would have preferred that there was more support in that sense I know for healthcare specifically, you can take a minor in entrepreneurship. But to be honest, I still don't really know what that entails.... a lot of Telfer courses and just like even the textbooks and resources they use, I think are extremely outdated and a lot of it's like theoretical studies of the past and stuff. But I think our world and our ecosystem have evolved so much*”. This was interesting because it appeared experience of non-entrepreneurship courses at Telfer had provided a negative perception despite having undertaken an introductory entrepreneurship course.

### ***Funding Opportunities***

Interviewees mentioned that they rely for the most part on the university entrepreneurial ecosystem for funding either directly or indirectly. One stated: “*we are currently part of the scale up garage and we were part of the start-up garage during the summer. This is a program run by the University of Ottawa to give you funding for your start-up and they help a lot in terms of mentorship, coaching, network, working with us, structure more of the business and get funding and really bring us to the right direction we are in today*”.

Another interviewee initially funded their idea with a grant from competitions and efforts in this regard continued. “*In order to get us off the ground and for us to hire the first two interns, we were able to pay for them through a grant that we actually got through a competition at Waterloo. Actually, it was a social innovation pitch competition. So, we won first place last summer. And that's where we started with the capital to hire on to the University of Waterloo which actually helped us to build out our beta version of the product... ..And*

*then now we we're signed on with the paid pilot with the University of Ottawa, which is keeping us going and we are looking for opportunities for growing”.*

Despite the uOttawa ecosystem helping funding via the likes of competitions, another interviewee noted: *“I've done everything on my own. Well, not my own, like me and my team, because we started as a freelancing agency, so we don't really need much validation and funding beside our clients that's the biggest validation, we literally get revenue there. So yeah, it's all on our own so far”.*

### ***Mentors***

Interviewees believed that the mentors were an, if not the most important resource of the entrepreneurial ecosystem. One interviewee stated: *“the mentor and one great prof (facilitator), who was a professor for one of my entrepreneurship classes, helped me a lot in terms of the network and introducing us to maybe other mentors that would help us develop the product arrangements. And the mentors we had, for example, at start-up garage helped us also a lot in terms of structuring our products.....It's just being well, coached and mentored helped us a lot in terms of bringing up the start-up”.* That same interviewee had made use of the mentors in the ecosystem at each stage in their start-up’s development and consulted with the mentors for major decision-making.

Another interviewee expressed that they benefitted from the facilitators in the entrepreneurial ecosystem by gaining entrepreneurial knowledge and support for their start-up. That person was now searching for technical mentorship elsewhere for their start-up. *“I used to work at a company. I'm still working in that company, the founder of that company is actually my mentor right now. So you would say uOttawa is not really ideal for technical mentorship”.*

Nevertheless, it was apparent that the interviewees' discourse varied depending on the stage their venture had reached. One interviewee mentioned how the mentors in the entrepreneurial ecosystem advised him in the process of starting up. *"I would say we had a lot of conversations with Prof. (facilitator). Prof. (facilitator) is very helpful. I also had a prof for one of my classes, Prof. (facilitator). Prof. (facilitator) was also great. I told him/her about our start-up. We got a lot of helpful advice. So those are really helpful people in the ecosystem. So like basically they're like free consultants available for us, thankfully they gave us some of their time"*. Nevertheless, mentoring extended to professors putting student entrepreneurs in touch with mentors external to the university as start-ups developed.

### ***Entrepreneurship Hub***

The Entrepreneurship Hub or the e-hub at the uOttawa entrepreneurial ecosystem was considered one of the biggest resources available to the student entrepreneurs by the interviewees. According to various interviewees, the e-hub acts as the centre of the resources within the ecosystem building their network. Linking with earlier themes, various interviewees gained access to various mentors and network partners to develop their start-up ideas through the e-hub. To illustrate, one interviewee said that *"I got introduced to my mentor through the e-hub, we definitely planned to get some more connection to the industry leaders and we are planning to do it through Prof. (facilitator) or any university alumni, but we haven't done it yet"*.

An interviewee mentioned how the events, competitions and programs of the Entrepreneurship Hub helped in building and growing their start-up. *"We took part in the elevator pitch, which is organised by the Entrepreneurship Hub every year and there's like awards for the first place and we had won second place for that pitch, the other award was the*

*audience award. So, we got a lot of traction in that competition, not necessarily validation, but a lot of networking that we're still using today to get validated through uOttawa. We are currently part of the scale-up garage and we were part of the start-up garage during the summer, which is a program run by the e-hub to give you funding for your start-up. And they help a lot in terms of mentorship, coaching, networks, working with us, structure more of the business and get funding and really bring us to the right direction we are in today.”*

### **4.5.3 Pattern 3: Network**

Linking with earlier issues to avoid repetition, interviewees nonetheless viewed networks as an issue in their own right. The interviewees identified the need to develop capabilities and importance of the resources available for this to take place as previously discussed. The pattern ‘networks’ is described by descriptive codes a) network as a resource b) networking as a capability.

#### ***Network (resource)***

All the participants emphasised the role of uOttawa as an important resource in developing networks. Similar to issues previously discussed in earlier sections, the interviewees discussed how the available networks led them to develop capabilities and grow their start-up. One interviewee who had passed through start-up and scale-up garage mentioned the following. *“Through the start-up garage program we had mentors assigned to us they helped us mainly in terms of market adoption, in terms of a strategy, a lot of strategy for our start-up and the other mentor, he's an expert in product development and he works for Shopify. These are two of the experts we have, plus a lot mentor through the university network.....We were in the start-up garage somewhere and now we're in scale up garage which is also run by the university and scaleup garage has board of Advisers and mentors that help you. I had a lot*

*of networking opportunities. Being part of the Telfer capital club also helped me network a lot”.*

One interviewee mentioned how networking helped the start-up get expert help for creating ideas. *“I will say we met some people in incubators in uOttawa, we spoke to them about our project. They told us the requirements we would need. So we're able to meet like actual incubators. We were able to go to competitions and see actual start-ups pitch for money and the university made sure it was visible to us, we were able to gain significantly from the networking events like, we were able to go to CPA events to go meet with experts”.*

### ***Networking (capability)***

Out of the various capabilities (and hence why it was viewed as a theme in its own right alongside a role in other themes) the interviewees highlighted networking as a key capability required for entrepreneurs to build a start-up and continue its growth. To limit repetition from points covered so far, one interviewee outlined the value of soft as well as hard skills as a capability from networking; that is, issues like public speaking within pitches. *“I would say public speaking and more in terms of pitching and sales. Every business, whatever type of business you're running, you'll have to be able to sell your business either to clients or to investors or to anyone that's going to come in your team. So you have to have these sales and networking capabilities.....So when I'm pitching, when it's for a client, anything, and it helped us go along. And how you say it helps us bring the business along. Both me and my co-founder are really good in terms of sales capabilities, I would say, is just like people skills in terms of networking. You cannot go anywhere in the business world without being able to build a network, but also being able to approach people and talk about what you're doing to a lot of people when you start a start-up.”* Another interviewee noted the capability in developing

*networks with key people that may change depending on circumstances. “There’s a large number people in the Telfer network and you need to use them....In the class we frequently get at least some CEOs, who are in my connection and helped us grow our product”.*

#### **4.5.4 Pattern 4: Barriers**

The interviewees were asked if they experience any barriers in the ecosystem in terms of their capability development and in the process of creation/development of their start-up. Interviewees perceived to varying degrees that there were certain barriers and possible improvements in the entrepreneurial ecosystem. In the context of issues raised so far, these featured: a) course work b) firm growth capabilities c) International Student.

##### ***Course Work***

The interviewees did not explicitly mention coursework as a barrier, but typically believed in some cases that the coursework was not adequate to develop entrepreneurial capabilities. One interviewee that believed coursework is not catching up with the speed of technology growth said the following. *“Well, it depends on what I want to do. First, let's say I want to build a job application, definitely I would take a course like this, literally nothing you could do. But let's say I want to build a website, there's no way I would go for a course since the web tech itself changes so fast or rapidly, the coursework is not even catching up on that front. So there's no way I would ever go for that, sometimes it also depends on what kind of project I want to do”.*

A further interviewee commented as follows. *“I think, to be honest, a lot of management courses and just like even the textbooks and resources they use, I think are extremely outdated and a lot of it's like theoretical studies of the past and stuff. But I think our world and our*

*ecosystem has evolved so much and I think, like sometimes I'm just like there's really no reason to be studying. Like, even I can get the first course on my hand, it might help others taking it based on a study like the history of the Web. And it's like - how is that going to be helpful for me if I know what web 1.0 is kind of thing. So I would say a lot of just like the material itself is outdated and I think a criticism that I have would be that I think business in general is a lot more practical than it is just like theoretical".* Such a comment was representative of perceptions related to courses outside of entrepreneurship.

Another interviewee added that the group projects and group work helped in developing team skills, but real cases would add more value. *"I've taken most entrepreneurship courses, so I have a couple more and I know the format is more simple, it's mainly group work. Yet I feel like these classes should take more of the form of a capstone work and a lot of the real projects, I guess the whole point is not to just take a class, create a fake project just to pass the class and drop it and then start thinking up of a real one based on the fake."* This comment raised an interesting perception regarding the way entrepreneurship courses take place in developing capabilities.

### ***Firm Growth Capabilities***

The interviewees typically perceived that developing capabilities in other fields than their enrolled degree was a challenge. For example, an interviewee pursuing a degree in finance and co-founded a technology start-up was looking for technical capability development opportunities. Another interviewee who is pursuing a management degree and co-founded a healthcare start-up said that their team required some knowledge in healthcare and was trying to develop capabilities related to that, but could not find options in the entrepreneurial ecosystem. *"I would say I definitely would have preferred that there was more support in*

*capability development sense, specifically for healthcare with a minor in entrepreneurship. But to be honest, I still don't really know what that entails. I don't really know what courses specifically are included in that and even with the Entrepreneurship Hub, I don't really know about it until my last year of university".* A further common consideration featured the barrier of time. To illustrate, *"I would say the only barrier for me was in terms of time, there isn't an infinite amount of time you have every day".*

### ***International Students***

Returning to an issue briefly mentioned in the statistical findings, certain interviewees were international students. These said that being an international student creates a number of barriers in the start-up creation process. For example, that the laws and immigration procedures were not favourable for international students to become entrepreneurs in Canada.

However, linguistic skills provided a barrier to certain students. *"Language is definitely one of the barriers, not just in business in general, and then that's first. Second one will be the course load, because we are required to do full time to let's say if I could do a part time student, then you make my life much easier and the business would definitely grow much easier, those are the legal side of things also the working time limit. And, a third one would be would be the resources that we could get hurt. Let's say some of the operation that you're going to do as a company you have to have a Canadian status you cannot do any security solely, So it is required to find someone who could do it, who are willing to take it on. So those are the major risks we need to manage, this is the three big things. The fourth, the upside of that is now we have the international connection that is out of Canada but on the other side of the growth, say those three that I mentioned are definitely the biggest barriers".*

The role of networks mentioned in earlier sections arose in the specific case of international students. As one interviewee explained, *“I think one of the biggest things is you have no connections to the local community, like entrepreneurship is all about networking. It's a lot about being open and being able to talk to people. In doing a start-up and being an entrepreneur, you're also forced to have Canadians involved with you to get incorporated. You need twenty five percent of your boards to be Canadian. So if you want to, if you're an international student and you want to register as a corporation, which is the only way you're going to get this - is the only way you're going to generate revenue - is the only way you're going to qualify to get into any you are entrepreneurship program you need a Canadian on your team who might not be your trusted friend. I remember and we went, we spoke to some people in immigration they were very honest with us, they were like, the acceptance rates are very low. The chances that you get approved are slim”*.

## **4.6 Summary**

This chapter presented the results from the mixed methods case study. The quantitative and qualitative findings featured data from facilitators, together with survey and interview results from student entrepreneurs. Chapter 5 presents a discussion of results and offers recommendations for stakeholder groups. Recommendations for future research feature to build on this case study of uOttawa.

## **CHAPTER 5. DISCUSSION, IMPLICATIONS AND RECOMENDATIONS**

### **5.1 Introduction**

Chapter 4 presented the results of this case study. This chapter provides a discussion of those key results, plus implications for theory together with practitioners. The chapter concludes with the recommendations for future research concerning capability development among student entrepreneurs. The research objectives were first, to investigate the capabilities that students pursuing entrepreneurial ventures perceive as important to help facilitate their sustainable start-up enterprise. Second, to evaluate students' perceived effectiveness of the university's entrepreneurial ecosystem that facilitates the development of these capabilities.

### **5.2 Discussion**

Although not restricted to the student population or indeed start-ups, recognition exists that many firms fail for a variety of reasons (Everett & Watson, 1998; Ucbasaran et al., 2010; Blank, 2013). In building on this body of literature, Teece's (2014, 2018) highlights the role of dynamic capabilities to sustain enduring entrepreneurial activities (as per Jaskiewicz et al., 2016). Dynamic capabilities reflect the ability of entrepreneurs to recognise opportunities, exploit opportunities, reconfigure assets and business models to meet the demands of changing environments. In contrast, Johnson et al. (2014) view threshold capabilities as the capabilities needed to meet the necessary requirements to compete. Such a distinction regarding capabilities is pertinent to this current study.

Specifically, since a body of knowledge exists regarding the notion of educating entrepreneurs, especially 'student entrepreneurs' and the role of 'university ecosystems'

(O'Shea et al., 2005, Astebro et al., 2012; Klofsten et al., 2019; Marzocchi et al., 2019; Snihur et al., 2021). The results of this current case study suggest that student entrepreneurs in the entrepreneurial ecosystem under investigation developed certain threshold capabilities perceived as important, but experienced difficulty developing those of a dynamic nature. Consequently, it is useful to consider the findings in more detail to arrive at insights regarding the perceived effectiveness of the entrepreneurial ecosystem.

Key considerations in line with the research questions outlined in Chapter 1 are therefore what capabilities are perceived as important and how should developed within the entrepreneurial ecosystem and what barriers exist? Leih & Teece (2016) suggests that universities should help build and improve difficult-to-imitate dynamic capabilities. In a broader sense, it is important that they possess the capabilities to validate their respective evolving business model (following Ostwalder & Pigneur, 2010; Gassmann et al., 2014). However, in order to make this case study manageable, a decision took place to focus on cross-disciplinary literature at the marketing/entrepreneurship interface (see Morris et al., 2002; Crick & Crick, 2018; Eggers et al., 2020; Hansen et al., 2020). Morris et al. (2002) suggest decision-makers exhibit: (a) proactive orientation (b) opportunity driven (c) customer intensity (d) Innovation focused (e) risk management (f) resource leveraging and (g) value creation. In this current study, student entrepreneurs were typically proactive and innovative in pursuing opportunities that carried risk, but attempted to create value for customers. In contrast, they varied with respect to their ability to leverage limited resources (broadly defined to include among other things time, finances and networks).

As such, the findings suggest the need to develop capabilities in all and not some of the entrepreneurial marketing capabilities advocated by Morris et al. (2002). Moreover, the results

suggest that certain facilitators raised doubts about the capabilities that certain entrepreneurs perceived they possessed. In other words, a possibility exists that some student entrepreneurs exhibited over confidence. However, such a notion is difficult to substantiate without seeing students' grades and/or evaluating the performance of their start-ups, but such data was not possible due to anonymity under the Ethic Committee's guidelines. Alternatively, certain student entrepreneurs recognized their limitations and highlighted the need for the entrepreneurial ecosystem to facilitate networks to help them overcome limited capabilities (and in some cases resources).

In fact, the role of networks arose in various capacities supporting the work of Lamine (2017), who recognises the importance of entrepreneurial networks in the process of venture creation. Moreover, it supports key work on business models as network relationships are a key facet of a business model canvas (as per Osterwalder & Pigneur, 2010). Belitski & Heron (2017) identified that educational institutions have increased participation in diverse networks to promote technology commercialization and entrepreneurship education. However, certain student entrepreneurs in this case study had more problems than other ones in developing effective networks and moving from generic threshold capabilities to those of a higher order to facilitate traction and scalability. As an illustration, although entrepreneurship courses within the entrepreneurial ecosystem provide students with an introduction to business modelling, various discourse from 'actors' raised doubts about capability development.

Jena (2020) identified that limitations exist in entrepreneurial ecosystems, including those caused by students' attitude towards entrepreneurship. Actors in this case study suggested that some students do not have any entrepreneurial intentions, but enrolled in entrepreneurship development programs for course credits. Their lack of motivation provided a barrier to

motivated student entrepreneurs in some cases regarding capability development. For example, causing extra work in validation of business models and associated coursework; not least, limiting time interfacing with potential network partners. Capability development in respect of hard and soft skills were important. For example, not only the capability of making network linkages, but also communication skills to appear professional (verbal pitches, written business plans, etc.).

Moreover, certain actors identified that being an international student was a potential barrier to their venture creation process. For example, immigration laws could act as a barrier for international students from certain countries. Likewise, linguistic/written skills and limited network partners provided potential barriers. As such, given the recognized importance of educating entrepreneurs, especially ‘student entrepreneurs’ and the role of ‘university ecosystems’ (O’Shea et al., 2005, Astebro et al., 2012; Klofsten et al., 2019; Marzocchi et al., 2019; Snihur et al., 2021), this study highlights the need to avoid treating student entrepreneurs in a generic sense. Instead, facilitators like in the Entrepreneurship Hub need to appreciate the likelihood that capabilities will vary including among domestic and international students; hence, tailored support is probably more useful subject to inevitable resource constraints. Indeed, as alluded to earlier, the case study provided insights to suggest that facilitators needed to help develop specific capabilities at particular stages of students’ entrepreneurial activities. While generic capabilities like an introduction to business models may be useful at an initial stage, specific capabilities help move a start-up forward, gaining traction and aiding scalability. Here, facilitators need to concentrate on facets of a business model like help adding value to customer segments (or specific assistance students require). This may require utilizing network partners with specialist knowledge like that relating to a sector. In short, this case study provided unique insights into the capability development activities in a specific ecosystem,

providing implications/recommendations for practitioners. Two research propositions follow in the context of the case study involving uOttawa.

P1: Student entrepreneurs primarily focus on developing specific threshold rather than dynamic capabilities while they are in the university.

P2: The institution's entrepreneurial ecosystem predominantly facilitates the development of threshold rather than dynamic capabilities among student entrepreneurs while they are in the university.

### **5.3 Implications/Recommendations for Practitioners**

In addition to its contribution to existing knowledge, this case study offers the following practitioner implications/recommendations. First, the university must continue to provide opportunities to develop threshold capabilities of a generic nature to engage student entrepreneurs and help them develop traction. This can take place in entrepreneurship courses like those featuring business models together with activities associated with the broader entrepreneurial ecosystem like competitions. However, this is not enough and tailored support is required to develop higher-level capabilities. The use of outside support may facilitate such capabilities like of a sector specific nature where this is not possible within the university. Moreover, recognition of differing capability development should exist for the needs of international students. This is likely to support their enduring entrepreneurial activities. Second, the university should consider including prerequisites for entrepreneurial programs to help ensure that less motivated students do not distract others. This will free time within the confines of a limited 12-week semester to add value to the student learning experience and facilitate their engagement and satisfaction. As such, the time and effort will provide an opportunity to build capabilities among motivated students to support start-up activities. In fact, this will help hard and soft skill development such as verbal pitches and written business

plans in addition to validating business models. Third, student entrepreneurs must share responsibility in finding opportunities to engage in activities across the entrepreneurial ecosystem to develop capabilities and not rest of the assumption that facilitators will seek them out. Indeed, facilitators have limited time and resources so are likely to support proactive student entrepreneurs.

#### **5.4 Limitations and Future Research**

While this current study has contributed to the existing body of knowledge, there are certain limitations. This investigation's focus was on student entrepreneurs, facilitators and background data to offer a thickness of data within a case study. However, due to the need for anonymity in respect of Ethics Committee guidelines, a sampling frame and hence appreciation of a response rate was not possible. Moreover, due to the COVID 19 pandemic, the interest among student entrepreneurs to participate in a research study was low. Consequently, interviews with more student entrepreneurs and facilitators in entrepreneurial ecosystems across different institutional contexts would be interesting. This might include international students' perceptions across different countries. Subject to problems in data collection, longitudinal data outlining capability development over time would be interesting (including stimuli and barriers). Additionally, employing different lenses to the current study may provide further insights. Finally, these limitations do not pose serious problems, but rather, highlight some interesting directions for future research regarding capability development and entrepreneurial ecosystems.

#### **5.5 Conclusion**

This study concludes that university entrepreneurial ecosystems should consider a focus of their limited resources towards the development of threshold capabilities to foster

students' interest in commencing start-up activities. However, to help enable student entrepreneurs to progress their start-up activities, the development of higher-level dynamic capabilities are important. In reality, unique insights in this case study suggests such a notion may more easily be said as opposed to actually done! The student entrepreneurs in this study were able to identify and describe their experiences in the uOttawa entrepreneurial ecosystem in terms of capability development. The background data provided by the facilitators added value to the study in contrast to a reliance on students' perceptions. Certain barriers that impede capability development offered particular insights. This study addresses a gap in existing research regarding capability development in university entrepreneurial ecosystems and offers opportunities for further research in particular contexts.

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## **APPENDIX 1. Interview protocol for student entrepreneurs**

### **Interview protocol for students of the University of Ottawa pursuing entrepreneurship.**

#### **Section 1: Participant's professional background**

This interview is conducted to understand your experiences while pursuing entrepreneurship and how important was the role of the University of Ottawa in developing your capabilities to become an entrepreneur managing your firm.

1. When did you start at the University of Ottawa?
2. Did you want to pursue entrepreneurship before joining the University of Ottawa? Why?
3. What program did/do you study? Prompt – in what way if any did this help build capabilities/skills and what capabilities were they?
4. How helpful were your course work and university activities in building capabilities to support creating your own technology business?
5. Were you and your team of uOttawa students able to create a technology product on your own? Prompt - if yes/no – why and who helped?
6. Can you share any documentation or websites about your business with me?
7. What were the main barriers to building capabilities and skills?
8. What are your current capabilities/skills?
9. What capabilities/skills are lacking?

Thank you for sharing your professional background and experiences.

#### **Section 2: To understand the resources and opportunities available to students at the University of Ottawa**

As a part of section 2 of this interview, I would like to understand the resources and opportunities available to students at the University of Ottawa for students pursuing entrepreneurship.

1. Did you completely build your prototype and to get it validated in the laboratories of the University of Ottawa?
2. How long were you planning for this project and did everything go on time?
3. How did you make use of mentors and professors of the University of Ottawa to develop your product?
4. What were the limitations and struggles converting the prototype to a viable product?
5. How did the resources available at the University of Ottawa help you overcome those limitations?
6. How were you supported in marketing and branding your product? Did you get financing/grants to develop and market this product?
7. Did you have access to any industry experts who helped you to augment your product's value?
8. What was the range of networks available to you through the University to scale your product?

Thank you so much for your patience in answering the questions. The data from this interview will be of great use for my research work. Can I get back to you over email or phone if I need any additional data on the above topic?

## APPENDIX 2. Survey Questionnaire

### Entrepreneurial Ecosystem Capability Development Survey

My name is Aravind Asokan, and I am conducting a research study as part of my Master's program to investigate the effectiveness of the University of Ottawa's entrepreneurial ecosystem in the development of capabilities among student start-ups.

1. When did you start at the University of Ottawa? (Year)

(dropdown box to choose year 2015 to 2020)

2. In what faculty of uOttawa is your degree registered?

(Drop down box) to choose one from

- a. Faculty of Arts
- b. Faculty of Education
- c. Faculty of Engineering
- d. Faculty of Health Sciences
- e. Faculty of Law
- f. Faculty of Medicine
- g. Faculty of Science
- h. Faculty of Social Science
- i. Telfer School of Management

3. At what time period did you decide to pursue entrepreneurship?

- a. I had ideas of becoming an entrepreneur before joining the uOttawa.
- b. I do not want to become an entrepreneur at the end of the degree.
- c. I wanted to become an entrepreneur after looking at the capability development opportunities available after starting studying at uOttawa.

4. How helpful are your course work and university activities in building core entrepreneurial capabilities?

Course work (Slider 1 to 5, not at all helpful to highly helpful)

University activities (Slider 1 to 5, not at all helpful to highly helpful)

5. Do you think you and your team will be able to create/grow your start-up (technology/knowledge intensive) with the help of the university resources available?

Create(Slider 1 to 5, not at all helpful to highly helpful)

Grow (Slider 1 to 5, not at all helpful to highly helpful)

6. To what extent do you believe you currently have key capabilities in the following areas?

(1 to 5 rating, not at all to a large extent)

- a. Technology
  - b. Coding
  - c. Public speaking
  - d. Pitching
  - e. Networking
  - f. Engaging people
  - g. Managing people
  - h. Building a team
  - i. Leadership
  - j. Marketing
  - k. Finance
  - l. Validating business models
7. Do you have a prototype or an idea for a start-up that is being validated?
- Prototype (yes/no)  
Idea(yes/no)
8. To what extent are the mentors useful in your start-up validation process?
- (1 to 5, not at all to a large extent)
9. To what extent do you think you have access to start-up networking events conducted to help you develop capabilities? (for example capabilities related to facilitating financial support, business advisors, actual entrepreneur meetings, entrepreneurship clubs and others)
- (1 to 5, not at all to a large extent)
10. Please rate the importance of the following entrepreneurial marketing dimensional capabilities you think are required to grow a start-up. (1 to 5, not at all important to highly important)
- a. Proactive orientation (Rate 1 to 5)
  - b. Opportunity driven (Rate 1 to 5)
  - c. Customer intensity (Rate 1 to 5)
  - d. Innovation focused (Rate 1 to 5)
  - e. Risk management (Rate 1 to 5)
  - f. Resource leveraging (Rate 1 to 5)
  - g. Value creation (Rate 1 to 5)
11. Please rate your capabilities in the following areas. (1 to 5, not at all to a large extent)
- a. Proactive orientation (Rate 1 to 5)
  - b. Opportunity driven (Rate 1 to 5)
  - c. Customer intensity (Rate 1 to 5)

- d. Innovation focused (Rate 1 to 5)
  - e. Risk management (Rate 1 to 5)
  - f. Resource leveraging (Rate 1 to 5)
  - g. Value creation (Rate 1 to 5)
12. To what extent have you been able to develop capabilities related to validating the following facets of a business model? (1 to 5, not at all to a large extent)
- a. Key partners (Rate 1 to 5)
  - b. Key resources (Rate 1 to 5)
  - c. Key activities associated to run the business (Rate 1 to 5)
  - d. Value proposition (Rate 1 to 5)
  - e. Customer relationships (Rate 1 to 5)
  - f. Channels related to distribution (Rate 1 to 5)
  - g. Customer segments (Rate 1 to 5)
  - h. Revenue streams (Rate 1 to 5)
  - i. Cost structure (Rate 1 to 5)
13. Are you an international student in Canada?
- a. Yes
  - b. No
14. To what extent do you think being an international student is a barrier for you to pursue entrepreneurship? (answer only if you are an international student else skip)
- (1 to 5, not at all to a large extent)
15. Would you like to share any documentation about your start-up or the uOttawa entrepreneurial ecosystem for this study (for example: website landing page)?
- (upload file) (not compulsory)
16. If you would like to contribute further to this investigation and be invited for an interview, please leave your email below.
- (short answer) (not compulsory)
- Thank you for your participation.

## APPENDIX 3. Consent form for interviews

### Interview participation consent form

**Name of student researcher:** Aravind Asokan

**Contact details:** \*\*\*\*\*@uottawa.ca

**Name of Supervisor:** Dr. David Crick (\*\*\*\*\*@uottawa.ca) **Affiliation:** Telfer School of Management, University of Ottawa

**Invitation to participate:** I am invited to participate in the research study entitled “**An Exploratory Investigation into the Effectiveness of the University of Ottawa’s Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups**”, conducted by Aravind Asokan.

**Purpose of the study:** I understand that the purpose of this study is to understand the capabilities required in facilitating student entrepreneurs to launch their firm while in university and how the opportunities and resources available in the University of Ottawa support capability development.

**Participation:** My participation will consist essentially of taking part in an individual interview lasting about 45 minutes to one hour. I agree to the recording of the interview to facilitate better data collection purposes.

**Benefits:** My participation in this study will enhance understanding of the resources available for student entrepreneurs in University of Ottawa.

**Confidentiality and anonymity:** I have received assurance from the researcher that the information I will share will remain strictly confidential. The contents will be used only for the current study “**An Exploratory Investigation into the Effectiveness of the University of Ottawa’s Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups**”.

Anonymity will be protected in the following manner. I have been assured that in written reports, my name and organization will be disguised.

**Conservation of data:** The data collected (digital recording of interview and interview transcript) will be kept in a secure manner. They will be stored on a computer with secure password. Only the student researcher and the supervisor will have access to the interview data. The data will be conserved for one year.

**Voluntary participation:** I am under no obligation to participate and if I choose to participate, I may withdraw from the study at any time and/or refuse to answer any questions. If I choose to withdraw, all data gathered until the time of withdrawal will be deleted.

**Acceptance:** I, \_\_\_\_\_, agree to participate in the above research study conducted by Aravind Asokan of the Telfer School of Management, whose research is under the supervision of Dr. David Crick. I understand that by agreeing to participate I am in no way waiving my right to withdraw from the study.

If I have any questions about the study, I may contact the student and/or the course professor at the emails mentioned above.

If I have any ethical concerns regarding my participation in this study, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, 550 Cumberland Street, Room 154, (613) 562-5387 or ethics@uottawa.ca.

There are two copies of the consent form, one of which is mine to keep.

Participant's signature: \_\_\_\_\_ Date: \_\_\_\_\_

Researcher's signature: \_\_\_\_\_ Aravind Asokan \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX 4. Informed consent form for survey

### Informed consent form

**Name of student researcher:** Aravind Asokan

**Contact details:** \*\*\*\*\*@uottawa.ca

**Name of Supervisor:** Dr. David Crick (\*\*\*\*\*@uottawa.ca) **Affiliation:** Telfer School of Management, University of Ottawa

**Invitation to participate:** I am invited to participate in the research study entitled “**An Exploratory Investigation into the Effectiveness of the University of Ottawa’s Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups**”, conducted by Aravind Asokan.

**Purpose of the study:** I understand that the purpose of this study is to understand the capabilities required in facilitating student entrepreneurs to launch their firm while in university and how the opportunities and resources available in the University of Ottawa support capability development.

**Participation:** My participation will consist essentially of responding to the survey questions. **Benefits:** My participation in this study will enhance understanding of the resources available for

student entrepreneurs in the University of Ottawa.

**Confidentiality and anonymity:** I am aware that my responses to the survey will remain strictly confidential. The contents will be used only for the current study “**An Exploratory Investigation into the Effectiveness of the University of Ottawa’s Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups**”.

Anonymity will be protected in the following manner. I have been assured that in written reports, my name and organization will be disguised. Any documents or data shared by me will not be published or will be shared with anyone else. Any data or documents shared with the principal investigator will remain confidential with access only to the principal investigator.

**Conservation of data:** The data collected (survey responses) will be kept in a secure manner. They will be stored on a computer with secure password. Only the student researcher and the supervisor will have access to the survey responses data. The data will be conserved for five years.

**Voluntary participation:** I am under no obligation to participate and if I choose to participate, I consent to participate anonymously in the survey and I understand that I will not be able to withdraw my participation after submitting the survey responses.

**Acceptance:** By responding to the survey I agree to participate in the above research study conducted by Aravind Asokan of the Telfer School of Management, whose research is under

the supervision of Dr. David Crick. I understand that by agreeing to participate I will not be able to withdraw my participation from the study.

If I have any questions about the study, I may contact the student and/or the course professor at the emails mentioned above.

If I have any ethical concerns regarding my participation in this study, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, 550 Cumberland Street, Room 154, (613) 562-5387 or ethics@uottawa.ca.

Researcher's signature: \_\_\_Aravind Asokan\_\_\_\_\_Date: \_\_\_\_\_30 -November - 2020\_\_\_\_\_

## **APPENDIX 5. Recruitment email format**

### **Recruitment Email for Students**

**SUBJECT:** Invitation to participate in an investigation involving student entrepreneurship at the University of Ottawa

Hello,

My name is Aravind Asokan, and I am conducting a research study as part of my Masters program to investigate the effectiveness of the University of Ottawa in the development of capabilities among student start-ups.

The purpose of this study is to understand the capabilities required in facilitating student entrepreneurs to launch their firm while in university and how the opportunities and resources available in the University of Ottawa support capability development.

#### **What will you be undertaking by participating in this study?**

You will be answering a number of questions regarding how the University of Ottawa's entrepreneurial support mechanisms helped facilitate your technology startup.

#### **How long is a session?**

Approximately 45 minutes to one hour.

#### **When and where?**

Via Skype or Zoom at a convenient time.

#### **If you consent to participating**

Please reply to this email with your contact information. I will get back to you to ask you some preliminary questions to help me ensure your startup firm meets the criteria for the study.

If you have any questions, please contact me at \*\*\*\*\*@uottawa.ca.

Regards,  
Aravind Asokan.

## APPENDIX 6. Research ethics approval certificate

**Université d'Ottawa**

Bureau d'éthique et d'intégrité de la recherche

**University of Ottawa**

Office of Research Ethics and Integrity

### S-08-20-6036 - REG-6036 - Certificat d'approbation éthique / Certificate of Ethics Approval

*(English message follows)*

Cher/Chère Aravind Asokan,

Veillez trouver ci-joint le certificat d'approbation éthique pour le projet intitulé «An Exploratory Investigation into the Effectiveness of the University of Ottawa's Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups ».

Le certificat est valide jusqu'au : 18-09-2021

Recherche financée : veuillez faire suivre une copie du certificat au [Service de gestion de la recherche](#).

Si vous avez des questions, n'hésitez pas à communiquer avec le Bureau d'éthique à [ethique@uottawa.ca](mailto:ethique@uottawa.ca) ou en composant le 613-562-5387.

Vous pouvez voir votre demande en vous connectant à votre compte [eReviews](#).

Cordialement,

Riana Marotte  
Responsable d'éthique en recherche

*Ceci est une réponse automatisée, merci de ne pas répondre à ce courriel.*

Dear Aravind Asokan,

Please find attached the certificate of ethics approval for your research project titled "An Exploratory Investigation into the Effectiveness of the University of Ottawa's Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups ".

This certificate is valid until: 18-09-2021

Funded research: A reminder that you must provide a copy of this certificate to [Research Management Services](#).

If you have any questions, please contact the Ethics Office at [ethics@uottawa.ca](mailto:ethics@uottawa.ca) or by telephone at 613-562-5387.

You can view your project at any time by logging into [eReviews](#).

Best regards,

Riana Marotte  
Protocol Officer

*This is an automated message. Please do not reply directly to this email.*

#### Attachement(s) / Attachment(s)

[approvalLetter1600531964727.pdf](#)

550, rue Cumberland, pièce 154    550 Cumberland Street, Room 154  
Ottawa (Ontario) K1N 6N5 Canada    Ottawa, Ontario K1N 6N5 Canada

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[www.recherche.uottawa.ca/deontologie](http://www.recherche.uottawa.ca/deontologie) | [www.recherche.uottawa.ca/ethics](http://www.recherche.uottawa.ca/ethics)

## APPENDIX 7. Research ethics approval certificate for modification (including surveys)

**Université d'Ottawa**

Bureau d'éthique et d'intégrité de la recherche

**University of Ottawa**

Office of Research Ethics and Integrity

### S-08-20-6036 - MOD1-6036 - Modification approuvée / Modification Approved

*(English message follows)*

Cher/Chère Aravind Asokan,

Merci d'avoir soumis une demande de modification pour votre projet de recherche intitulé «An Exploratory Investigation into the Effectiveness of the University of Ottawa's Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups».

Ces modifications ont été approuvées et sont assujetties au certificat d'approbation éthique, valide jusqu'au 18-09-2021.

**Data collection:** Student entrepreneurs will be asked to complete an online anonymous survey.

Si vous avez des questions, n'hésitez pas à communiquer avec le Bureau d'éthique au [ethique@uottawa.ca](mailto:ethique@uottawa.ca) ou au 613-562-5387.

Vous pouvez voir votre demande en vous connectant à votre compte [eReviews](#).

Cordialement,

Riana Marcotte  
Responsable d'éthique en recherche  
Président(e) : Barbara Graves  
CÉR : Comité d'éthique de la recherche en sciences sociales et humanités / Social Sciences and Humanities Research Ethics Board

*Ceci est une réponse automatisée, merci de ne pas répondre à ce courriel.*

Dear Aravind Asokan,

Thank you for submitting a modification request for your research project titled "An Exploratory Investigation into the Effectiveness of the University of Ottawa's Entrepreneurial Eco-system in the Development of Threshold Capabilities among Student Start-ups".

These modifications are now covered under the certificate of ethics approval, valid until 18-09-2021.

**Data collection:** Student entrepreneurs will be asked to complete an online anonymous survey.

If you have any questions, please contact the Ethics Office at [ethics@uottawa.ca](mailto:ethics@uottawa.ca) or 613-562-5387.

You can view your project at any time by logging into [eReviews](#).

Best regards,

Riana Marcotte  
Protocol Officer  
Chair: Barbara Graves  
REB: Comité d'éthique de la recherche en sciences sociales et humanités / Social Sciences and Humanities Research Ethics Board

*This is an automated message. Please do not reply directly to this email.*

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[www.recherche.uottawa.ca/deontologie](http://www.recherche.uottawa.ca/deontologie) | [www.recherche.uottawa.ca/ethics](http://www.recherche.uottawa.ca/ethics)