Essays on the Political Economy of Innovative Startups

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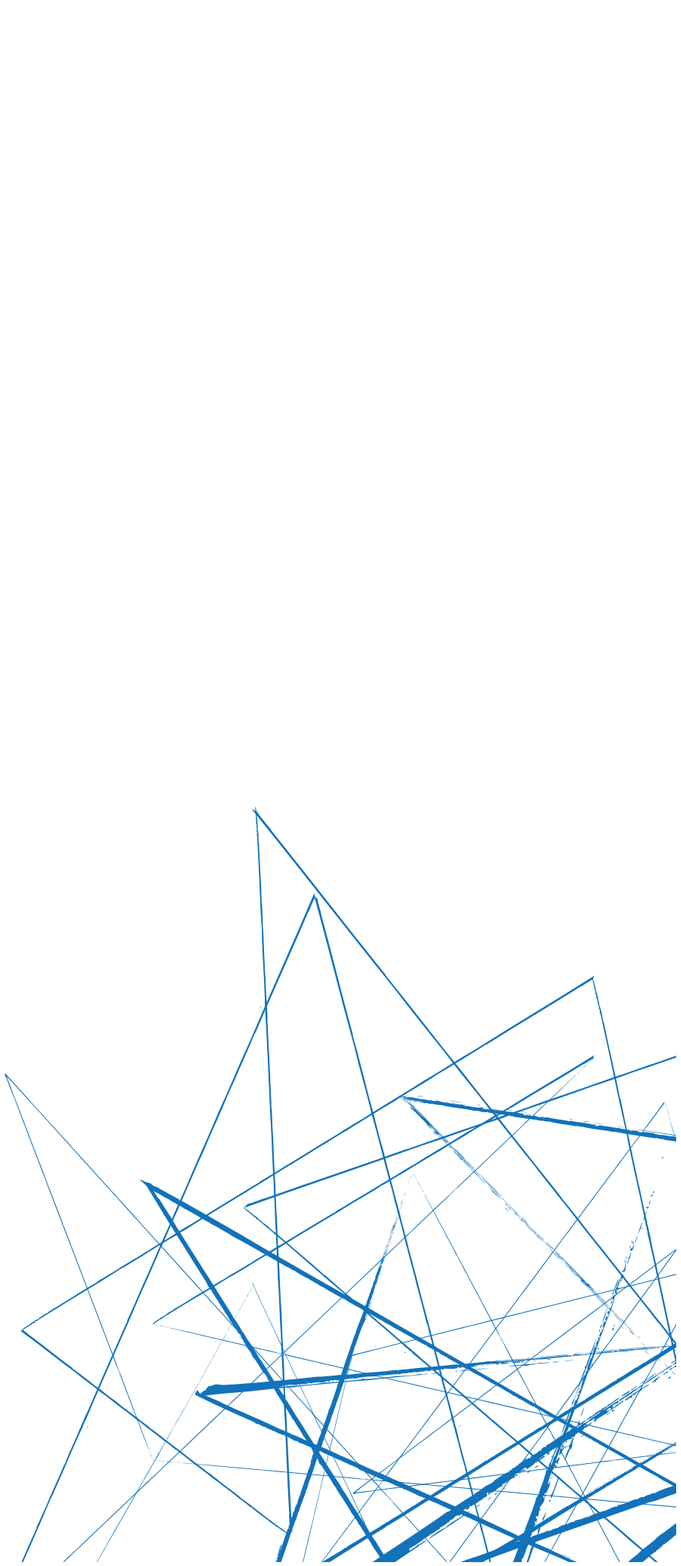
ESSAYS ON THE POLITICAL ECONOMY OF INNOVATIVE STARTUPS



PhD Series 42.2023

Jun Yuan (Julian) Seng

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HANDELSHØJSKOLEN

ESSAYS ON THE POLITICAL ECONOMY OF INNOVATIVE STARTUPS

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English Abstract

The thesis examines the political economy of innovative startups through three essays. The three main chapters of the thesis comprise three individual research papers written to answer separate research questions, but they are all bounded together by a common aim of investigating the political economy of innovative startups and how the wider contextual environment affects startup growth. In this regard, the first paper is a theoretical piece that positions startup-centric innovation policy in the wider literature on industrial policy. Together with my co-authors, we conceptualise startup-centric innovation policy in terms of four key attributes – age/newness, type of firm, target audience, and instruments used. The second paper investigates the role and influence of government policy on the development of the entrepreneurial ecosystem in terms of its coordinative aspects and underlying ecosystem dynamics. Finally, the third paper examines cultural change in the entrepreneurial ecosystem and its role on startup venture creation.

Danish Abstract

Afhandlingen undersøger den politiske økonomi i innovative nystartede virksomheder gennem tre essays. Afhandlingens tre hovedkapitler består af tre individuelle forskningsartikler, der er skrevet for at besvare separate forskningsspørgsmål, men de er alle bundet sammen af et fælles mål om at undersøge den politiske økonomi i innovative nystartede virksomheder og hvordan det bredere kontekstuelle miljø påvirker væksten i nystartede virksomheder. Den første artikel er et teoretisk værk, der placerer startup-centreret innovationspolitik i den bredere litteratur om industripolitik. Sammen med mine medforfattere konceptualiserer vi startup-centreret innovationspolitik ud fra fire nøgle-egenskaber - alder/nyhed, virksomhedstype, målgruppe og anvendte instrumenter. Den anden artikel undersøger den offentlige politiks rolle og indflydelse på udviklingen af iværksætterøkosystemet med hensyn til de koordinerende aspekter og den underliggende dynamik i økosystemet. Endelig undersøger den tredje artikel kulturelle ændringer i iværksætterøkosystemet og deres betydning for oprettelsen af nye virksomheder.

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LIST OF ABBREVIATIONS

ACE	Action Community for Entrepreneur
CUHK	Chinese University of Hong Kong
CVCF	Cyberport Venture Capital Forum
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
GEN	Global Entrepreneurship Network
GIA	Global Innovation Alliance
GVC	Global Value Chain
HKSTP	Hong Kong Science and Technology Park
HKU	University of Hong Kong
IP	Intellectual Property
IPO	Initial Public Offering
ITVP	Innovation and Technology Venture Fund
JTC	Jurong Town Corporation
MITI	Ministry of International Trade and Industry
NIS	National Innovation System
NIY	Young Innovative Companies
NOC	National University of Singapore Overseas College
NSTB	National Science and Technology Board
NUS	National University of Singapore
OECD	Organisation for Economic Co-operation and Development
SNAP	Startup Nations Atlas of Policies
SPRING	Standards, Productivity, and Innovation Board
STI	Science, Technology, and Innovation
T21	Technoprenuership 21
VC	Venture Capital
YES Schools	Young Entrepreneurs for Schools

ESSAYS ON THE POLITICAL ECONOMY OF INNOVATIVE STARTUPS

CHAPTER ONE

INTRODUCTION

1. Purpose of the dissertation

This dissertation focuses on the context in which innovative startups emerge and grow. Innovative startups refer to new ventures which introduce technologies into the market and commercialise innovation, contributing to economic growth (Audretsch, 2002, 2004; Colombelli and Quataro, 2018). Between 2018 to 2020, innovative startups globally generated over $3.8 trillion in economic value (Startup Genome, 2021). Innovative startups do not function in isolation, but exist within a wider environment. The non-linear and complex process of innovation (Chesbrough et al., 2006; Walrave et al., 2018) suggest that innovative ventures need to depend on other actors in the wider environment to build up innovation capabilities (Fukugawa, 2018).

To foster the growth of these innovative startups, governments around the world have implemented dedicated policies pertaining to startup growth (Huggins and Williams, 2011; Klingler-Vidra and Wade, 2020; Minniti, 2008). Such policies targeting startups are implemented with specialised programs being set up to provide dedicated support to nurture the growth of innovative startups. Examples of such policies include Singapore's Technopreneurship 21 (T21) program launched in 1999, Japan's J-startup program launched in 2017 (METI, 2018), Singapore's Technopreneurship 21 (T21) program launched in 1999 (Wong, 2001), and the Young Innovative Companies (NIY) funding program, Finland's first entrepreneurship policy aimed at young innovative growth firms (Autio and Rannikko, 2016). These policies typically cover a wide range of areas such as finance, human capital, infrastructure, and R&D (Audretsch et al., 2020; Isenberg, 2011; Zhao and Ziedonis, 2020).

Yet, despite the range of government policies targeting startup growth, there remains a lack of knowledge on how we can systematically theorise such policies and evaluate their effectiveness. Startup policies are highly heterogenous and fragmented and this heterogeneity makes it both difficult to compare policies across countries and also limits our assessment of their effectiveness due to the different outcomes achieved (Audretsch et al., 2020). Research investigating the effectiveness of startup policies remains mixed and inconclusive. Studies

investigating specific policies such as funding support have found that such policies are effective in providing key resources to startups needed for their growth (Giraudo et al., 2019). In terms of bespoke national startup programmes, the effectiveness of such programmes is also evident in the number of unicorns being produced. For example, the United Kingdom's Future Fifty programme which helps to support startup growth has been touted to be an effective policy as it has produced numerous unicorn successes such as Darktrace and Skyscanner. However, on the other hand, Roman et al., (2013) studied the effects of government startup incentives programs in several European countries and suggested that such programs were effective if we regarded them as labour policies targeted at increasing employment but were instead ineffective if they were entrepreneurship policies aimed at promoting innovation and economic growth. In another, Acs et al., (2016) argue that most entrepreneurship policies are ineffective as they tend to encourage individuals who were in the first place already intent on becoming entrepreneurs. Acs et al. (2016, p.50) further suggest that "successful policy measures will likely involve subtle and pervasive policy initiatives that have the unintended consequence of changing people's minds about the costs and benefits of entrepreneurship".

Governments also face several challenges when implementing policies to support startup growth. Some of the challenges include the difficulty of measuring the impact of startup policy, reluctance of entrepreneurs to make use of startup policy measures, and unintended consequences of startup policy. First, governments face the challenge of evaluating the effectiveness of the startup policies. While policymakers around the world have implemented government policies to support the growth of startups, there remains a lack of evaluation guidelines and measurement tools for these policies. Existing evaluation approaches often assume a linear causal relationship between the input and the output of startup policy and fail to capture the complexity of such policies (Alänge et al., 2022). However, startup policy often comprise complicated and complex interventions which result in emergent outcomes (Rogers, 2008). Policymakers may not be able to develop specific indicators in advance to evaluate the impact of startup policy. Moreover, current evaluation of startup policy is focused on understanding the results of the policies and fail to fully explain the mechanisms behind how startup policy work (Arnold et al., 2018). To capture the complexity of startup policy and achieve a more complete evaluation of its effectiveness, policymakers need to come up with better evaluation tools to take into account the dynamism of such policy and the potential influencing factors which may arise during its implementation.

Second, policymakers may also face reluctance from entrepreneurs in terms of accessing the support offered via startup policy. While the government may have introduced a series of

policy initiatives aimed at supporting the growth of startups, the ultimate decision of utilising these measures lies with the entrepreneur. Some of the reasons for the reluctance of entrepreneurs in accessing startup policy initiatives include bureaucratic procedures (Patel and Wolfe, 2022), the desire for autonomy and independence (North and Smallbone, 2006), and the distrust of policymakers (Niska and Vesala, 2013). Last, startup policy meaning to support the growth of startups may also have other unintended consequences on society. For example, while public funding may help startups to grow (Autio and Ranikko, 2016), these targeted subsidies may also lead to political favouritism or rent seeking (Bradley et al., 2021). Moreover, policymakers also need to consider trade-offs when implementing startup policy. Startup policy which focuses on high-growth entrepreneurship tend to benefit innovative startups that can achieve rapid growth (Autio et al., 2007). With scarce resources, policymakers may have to forego other more inclusive entrepreneurship policies that prioritises social good or sustainability (Autio and Rannikko, 2016).

Despite the phenomenon where many governments around the world, especially East Asian economies (eg. Singapore and South Korea), have shifted their focus from manufacturing-led, and often large-firm driven, industrialisation, towards information-technology focused, and high-growth entrepreneurship fuelled, economic growth, existing political economy literature has paid relatively limited attention to understanding technology-centric entrepreneurship policy. Existing studies focus on the political economy of innovation more broadly as opposed to investigating innovative entrepreneurship in the form of innovative startups (Link and Siegel, 2007; Martin and Scott, 2000; Mazzucato, 2013; Taylor, 2016; Weiss, 2014). Martin and Scott (2000, p.438) argued for government intervention in the innovation sector as private firms will often under-invest in R&D due to the incompatibility of knowledge and uncertainty in generating long-term profits. Link and Siegel (2007, p.158) also argued for the state to play an active role in investment as private firms lack the financial and technical capabilities to develop expensive technology. In his book *Innovation and the State*, Breznitz (2007) compared the development of the IT industry in Ireland, Israel, and Taiwan and concluded that in this age of globalisation, states still retain their capacity to play an active role in economic development. Moving away from the question of whether the state has a role in the development of innovation, Breznitz (2007, p.4) argued that states have several paths to choose from when it comes to the development of innovation-based industries.

Likewise, in her book *The Entrepreneurial State,* Mazzucato (2013) argues that the state has a critical role to play in developing technologies. The state is not only crucial on the supply side, but also on the demand side, in terms of "the deployment and diffusion of new technologies"

(Mazzucato, 2013, p.8). She further argues that in the case of the US, the state has taken an active role in shaping the market to spur innovation (Mazzucato, 2013, p.79). For example, in the 1990s, the US government actively promoted nanotechnology through the National Nanotechnology Initiative (NNI). The state's role was not only significant in terms of providing initial investments but also in creating extensive networks that brought together different key players such as scientific laboratories, universities, and government organisations (Motoyama, Appelbaum & Parker, 2011, pp.109-19). However, it must be recognised that while Mazzucato (2013) uses the word "entrepreneurial" in her book title, her starting point of analysis is the economic and social structures of the US and not on innovative startups and entrepreneurs.

This dissertation notes that the term "innovation" should not be conflated with "entrepreneurship" and aims to close the gap within existing political economy literature on entrepreneurship by investigating the missing empirical area of innovative startups. Moving away from focusing on the development and diffusion of innovation at the firm-level and more broadly the innovation systems literature, the dissertation studies the growth and development of innovative startups by anchoring itself within entrepreneurial ecosystems literature as well as drawing from wider political economy and sociological theories.

The rest of the introductory chapter is organised into three sections: the first section positions the dissertation in the context of ongoing research on the wider context in which the innovative startup functions in, otherwise known as the entrepreneurial ecosystem. The next section then presents a summary of the three papers included in the dissertation with an elaboration of their research questions, methods, how their address current research gaps, and the main findings. The final section concludes.

1.1 Situating the dissertation in entrepreneurial ecosystem literature

In the last decade, the entrepreneurial ecosystem concept has attracted much attention (Alvedalen and Boschma, 2017; Isenberg, 2010, 2011; Stam 2015). Existing entrepreneurship literature has paid little attention to the interrelated aspects of entrepreneurship (Alvedalen and Boschma, 2017). Scholars have also argued that there is a lack of studies on the systemic nature of entrepreneurship (Acs et al., 2014; Gustafsson and Autio, 2011; Qian et al., 2013; Szerb et al., 2013). Responding to the calls of paying more attention to the broader context of entrepreneurship, the entrepreneurial ecosystem concept first emerged as an approach to study entrepreneurship via a systemic perspective.

One of the early works on the entrepreneurial ecosystem is Cohen's (2006) piece titled "Sustainable Valley Entrepreneurial Ecosystem" in which he studied sustainable entrepreneurship by drawing on the concepts of environmental sustainability for his observation of the entrepreneurial ecosystem in Victoria, British Columbia. Isenberg (2010) later popularised the entrepreneurial ecosystem concept in his policy-oriented work where he categorised the entrepreneurial ecosystem into six core elements: markets, policy, human capital, finance, culture and supports. Having access to markets ensures that entrepreneurial start-ups are able to generate enough revenues to sustain their activity while enabling policies such as regulatory frameworks create a favourable business environment for startups. The presence of strong human capital ensures that start-ups are able to attract and recruit the best workforce. In terms of finance, the availability of funding helps to ensure that start-ups receive the necessary funds to operate and grow in scale. As for culture, a right mix of values and norms help to increase the take-up of entrepreneurial activity. Lastly, supports refer to institutional and infrastructural supports which create a conducive environment for entrepreneurial activity to happen. Another seminal work is Feld's (2012) book on the entrepreneurial ecosystem in Boulder, Colorado, where he explores how to build a thriving entrepreneurial ecosystem based on his own experience as an entrepreneur and investor.

While the early works on the entrepreneurial ecosystem were based on specific case studies and had different theoretical approaches, the general consensus was that an entrepreneurial ecosystem could be seen as a geographically defined area that encompasses "different interconnected actors and factors such as human capital, networks and institutions" (Alvedalen and Boschma, 2017, p.893). In this light, the entrepreneurial ecosystem literature can be seen as an attempt to move entrepreneurship literature in the direction of the Innovation System (IS) literature (Freeman, 1987) which studies the networks of actors that are involved in the generation, diffusion and use of innovations (Qian et al., 2013). While the IS literature has its core focus on organisations and institutions, it has paid little attention to entrepreneurship (Acs et al., 2014; Landström et al., 2015; Landström et al., 2012). As Acs et al. (2014) pointed out, "it is perhaps a little surprising, if not even ironic, that although the National Innovation System literature was heavily influenced by the Schumpeterian tradition, the entrepreneur remained conspicuously absent in this literature" (pp.477-478). By uncovering the black box of the entrepreneur, the entrepreneurial ecosystem literature can be seen as a complement to the IS literature.

There are, however, key differences between an entrepreneurial ecosystem and innovation system, such as the main focus and the locus of action of the system (Stam and Spigel, 2016). In

an entrepreneurial ecosystem, startups are the main focus and entrepreneurs constitute the core actors in "building and sustaining the ecosystem" while in an innovation system, the main focus lies in the "economic and social structures of a place that influence overall innovation and firm competitiveness" (Stam and Spigel, 2016, p.5). Instead of the individual, the core actors in the innovation system are private firms and the state. A conflation of the term "innovation" with "entrepreneurship" can thus result in inaccurate analyses of what an entrepreneurial ecosystem is as well as how the ecosystem originated and developed. This, however, does not imply that work on the entrepreneurial ecosystems cannot draw on the abundance of research underlying the concept of the national innovation system. Instead, the findings from works on entrepreneurship "must be reinterpreted through the agent-centred approach that is at the heart of the entrepreneurial ecosystem approach" (Stam and Spigel, 2016, p.6).

The entrepreneurial ecosystem literature has a focus on high-growth or ambitious entrepreneurship. In particular, the type of entrepreneurship that is studied often refers to "individuals exploring opportunities to discover and evaluate new goods and services and exploit them in order to add as much value as possible" (Stam and Spigel, 2017, p.1). It typically excludes the traditional statistical indicators of entrepreneurship such as "self-employment" or "small businesses". Within the entrepreneurial ecosystem literature, there is a wide range of definitions to what exactly constitutes an entrepreneurial ecosystem (see Cavallo et al., 2019). However, Stam (2015) provides one of the most widely used definition due to its comprehensive nature where it includes all the core elements of the entrepreneurial ecosystem (Acs et al., 2017). According to Stam (2015, p.1765), an entrepreneurial ecosystem refers to "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory".

The key output of the entrepreneurial ecosystem is entrepreneurial activity. Entrepreneurial activity can be measured by looking at two aspects: quantity and quality (Pacheco Pardo and Klinger-Vidra, 2019). A growth in the quantity of entrepreneurship will refer to both the increasing number of entrepreneurs launching a startup and the increasing number of startup exits (when a startup founder gets bought out or when the startup issues their shares to the public). A growth in the quality of entrepreneurship will refer to higher amount of revenues, private capital raised as well as exit values. Another way of measuring the output of the entrepreneurial ecosystem is by looking at the number of unicorns (startups valued at more than $1 billion) produced (Acs et al., 2017; Bruns et al., 2017). The difference in the number of unicorns emerging

across different territories can be taken as a reflection of the differing entrepreneurial ecosystem performance (Acs et al., 2017).

It is also important to note that the entrepreneurial ecosystem concept is not industry-specific unlike other concepts such as industrial districts and clusters (Autio et al., 2018; Spigel, 2017; Pitelis, 2012). Research on entrepreneurial ecosystems take into account different firms in different industries as long as these firms are innovative and growth oriented (Stam and Spigel, 2016). Recent works have went on further to expand the entrepreneurial ecosystem concept by studying the entrepreneurial ecosystem dynamics (Acs et al., 2017; Spigel, 2017; Audretsch and Belitski, 2017), the support mechanisms beneficial to start-ups (Audretsch et al., 2018; Edelman and Yli-Renko, 2010), the impact of institutions on entrepreneurial ecosystems (Alvedalen and Boschma, 2017; Autio et al., 2014), the role of networks in the entrepreneurial ecosystem (Partanen et al., 2014; Ter Wal and Boschma, 2011; Audretsch et al., 2018), the role of entrepreneurship education in the ecosystem (Maritz et al, 2016; Martiz, 2017; Wright et al, 2017) as well as the performance of entrepreneurial ecosystems (Sussan and Acs, 2017; Kuratko et al., 2017).

Despite the increasing popularity of the entrepreneurial ecosystem concept, there are several challenges and limitations of the concept. First, there remains a lack of consensus on the definition and measurement of the concept. While the term “entrepreneurial ecosystem” was popularised by Isenberg (2010) in his seminal piece in Harvard Business Review, the concept has its roots in earlier academic works relating to the infrastructure for entrepreneurship (van de Ven, 1993) and the systems approach to studying entrepreneurship (Spiling, 1996; Neck et al., 2004). Different from earlier works, the entrepreneurial ecosystem distinguishes itself by highlighting the complex networks and interdependencies between the diverse actors within the environment (Cavallo et al., 2019). The term “ecosystem” which originates from the biology discipline refers to an assemblage of living organisms interacting within their physical environment (Tansley, 1935). Despite its origin in biology, the “ecosystem” concept has been frequently used in the business and management literature (Cavallo et al., 2019). For example, James Moore (1993) coined the term “business ecosystem” in which “companies coevolve capabilities around a new innovation”. The business ecosystem is defined as “an economic community supported by a foundation of interacting organisations and individuals – the organisms of the business world” (Moore, 1996, p.26).

When it comes to defining the entrepreneurial ecosystem, scholars remain divided regarding how the entrepreneurial ecosystem should be defined (Cao and Shi, 2021). As Spigel

(2017, p.1) suggests, the entrepreneurial ecosystem concept appears to be "a conceptual umbrella encompassing a variety of different perspectives on the geography of entrepreneurship rather than a coherent theory". Table 1 presents the definitions provided by some of the most influential articles in entrepreneurial ecosystem research based on a citation analysis conducted by Theodoraki et al. (2022). Despite several definitions being used by scholars within the entrepreneurial ecosystem, scholars generally agree that the entrepreneurial ecosystem is made up of networks (Cho et al., 2022) and that the ecosystem focuses "on the environment surrounding entrepreneurs, including social and contextual factors" (Theodoraki et al., 2022, p.347). The entrepreneurial ecosystem is largely regarded as a spatial concept (Audretsch and Belitski, 2017; Mason and Brown, 2014) and helps to explain the difference in levels of entrepreneurship across places (Stam, 2015; Spigel, 2015). This PhD thesis uses the definition provided by Erik Stam in his paper published in 2015 which is one of the most influential papers in the entrepreneurial ecosystem field (Theodoraki et al., 2022). This study uses Stam's (2015) definition as it is a widely accepted definition in the field and it is also a comprehensive definition where it includes all the core elements of the entrepreneurial ecosystem (Acs et al., 2017). An entrepreneurial ecosystem refers to "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam, 2015, p.1765).

Table 1. List of some definitions of entrepreneurial ecosystem

Authors and year	**Article's Title**	**Journal**	**Definition provided**
Stam (2015)	Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique	European Planning Studies	"The entrepreneurial ecosystem as a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory." (p.1765)
Spigel (2017)	The Relational Organisation of Entrepreneurial Ecosystems	Entrepreneurship Theory and Practice	"A combination of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage

			nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures" (p.50)
Cohen (2006)	Sustainable Valley Entrepreneurial Ecosystems	Business Strategy and the Environment	"Sustainable entrepreneurial ecosystems are defined as an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures" (p. 3)
Autio et al. (2018)	Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems	Strategic Entrepreneurship Journal	"We suggest that it is useful to view entrepreneurial ecosystems as a digital economy phenomenon that harnesses technological affordances to facilitate entrepreneurial opportunity pursuit by new ventures through radical business model innovation." (p.74)
Audretsch and Belitski (2017)	Entrepreneurial ecosystems in cities: establishing the framework conditions	The Journal of Technology Transfer	"A dynamic community of inter dependent actors (entrepreneurs, supplies, buyer, government, etc.) and system-level institutional, informational and socioeconomic contexts… interact via information technologies and networks to create new ideas and more efficient policies" (p. 4)
Mack and Mayer (2016)	The evolutionary dynamics of	Urban Studies	"Entrepreneurial ecosystems (EE) consist of interacting components, which foster new firm formation

	entrepreneurial ecosystems		and associated regional entrepreneurial activities" (p.3)
Spigel and Harrison (2018)	Toward a process theory of entrepreneurial ecosystems	Strategic Entrepreneurship Journal	"EE can be seen as ongoing processes through which resources develop within an ecosystem, flow between entrepreneurs and other actors, and create or attract more resources over time, changing the overall structure of the ecosystem." (p.164)

Additionally, the entrepreneurial ecosystem concept also faces difficulty in terms of its measurement. There is a lack of reliable and systematic metrics to compare entrepreneurial ecosystems (Bruns et al., 2017; Leendertse et al., 2022). Earlier studies focused on contexualising entrepreneurship have attempted to measure national entrepreneurship systems (Acs et al., 2014; Radosevic and Yoruk, 2013) but these works do not draw from any of the frameworks emanating from the entrepreneurial ecosystem field. Most recently, Stam and Van de Ven (2021) have conceptualised an entrepreneurial ecosystem index which measures the ten key elements of the entrepreneurial ecosystem by studying twelve regional entrepreneurial ecosystems in the Netherlands. Such an entrepreneurial ecosystem index allows for a systematic comparison across multiple entrepreneurial ecosystems. Leendertse et al. (2022) further developed the entrepreneurial ecosystem index (Stam and Van de Ven, 2021) to show the interdependence of the ten key elements by extending the comparison to 273 regions in 28 countries in Europe. While the literature remains nascent in measuring the quality of entrepreneurial ecosystems, there is growing consensus on how to measure the output of entrepreneurial ecosystems. Typically, the output of entrepreneurial ecosystems refers to productive entrepreneurship. Productive entrepreneurship has been operationalised as the number of innovative new firms (Stam and Van de Ven, 2021; Henrekson and Johansson, 2010; Stam and Bosma, 2015), the number of unicorns (Acs et al., 2017) or both the number of innovative new firms and unicorns (Leedertse et al., 2022).

Second, while the entrepreneurial ecosystem concept was developed to pay more attention to the context of entrepreneurship, more research needs to be done on the entrepreneurial ecosystem's own context. Within studies on the context of entrepreneurship, a frequent line of inquiry is the investigation on how institutions affect entrepreneurial activity. It is widely accepted that institutions (political, legal, and cultural) directly affect entrepreneurial activity as they influence the environment entrepreneurs operate in (Baumol, 1990). Entrepreneurship scholars have increasingly studied the effect of institutions on entrepreneurship by examining how the institutional environments enable or constrain entrepreneurial activity (for example: Aldrich and Fiol, 1994; Carney and Gedajlovic, 2002). As a concept developed to explain the wider environment of entrepreneurship, the entrepreneurial ecosystem concept focuses on the interconnected factors and actors within the wider environment that helps to foster entrepreneurship (Stam, 2015).

However, entrepreneurial ecosystems are also embedded within an institutional environment affected by both formal and informal institutions such as government policy and culture. Studies on the context in which entrepreneurial ecosystems develop remain lacking (Mason and Brown, 2014; Mack and Mayer, 2016). For example, existing literature which studies the importance of institutions on entrepreneurial ecosystems tend to provide a list of local institutions at one point in time and lack an overview of the impact of institutions in the development of the entrepreneurial ecosystem (Lowe and Feldman, 2017). As an informal institution, culture is a key factor in the context of entrepreneurial ecosystems. Entrepreneurial culture can affect the development of an entrepreneurial ecosystem (Bischoff, 2021; Mason and Brown, 2014). A positive entrepreneurial culture can refer to high awareness for entrepreneurship (Aviram, 2010), entrepreneurship-friendly environments (Chatman et al., 2008), and a culture of risk-taking and innovative behaviour (Isenberg, 2010). Studies have also shown that differences in national culture can affect how different entrepreneurial ecosystems perform, leading to varying levels of productive entrepreneurship (Andersson, 2015; Breazeale et al., 2015). Despite these studies on entrepreneurship culture, it remains unclear on how culture affects the emergence and evolution of an entrepreneurial ecosystem over time (Stam and Spigel, 2017). The mechanisms in which a positive entrepreneurial culture leads to a growing entrepreneurial ecosystem are also under-explored.

Last, there is also the potential trade-off between economic growth and sustainability. Studies on the entrepreneurial ecosystem concept have typically focused on how productive entrepreneurship can generate economic growth and regional development (Autio et al., 2018;

Spigel, 2017). Productive entrepreneurship often refers to high-growth firms such as innovative startups and the literature on entrepreneurial ecosystems remains unclear on whether such ecosystems support sustainability (DiVito and Ingen-Housz, 2021). While focused on driving innovation and economic development, research on the entrepreneurial ecosystem has been weak in incorporating sustainability issues (Volkmann et al., 2021; Malecki, 2018). This may potentially lead to policymakers neglecting sustainability when they choose to embrace the entrepreneurial ecosystem concept for entrepreneurship and innovation policymaking.

To take into account of sustainability and improve the entrepreneurial ecosystem's applicability within policymaking, scholars have started to expand the concept by integrating sustainability literature to acknowledge the growing phenomenon of sustainable entrepreneurship (Volkmann et al., 2021). One of the first works to incorporate a sustainability dimension is from Cohen, where he defined a sustainable entrepreneurial ecosystem as "an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures" (Cohen, 2006, p.3). More recently, studies have investigated the role entrepreneurs play in facilitating the sustainability cause within their local entrepreneurial ecosystems (O'Shea et al., 2021; Pankov, 2021), the role of universities in sustainable entrepreneurial ecosystems (Theodoraki et al., 2017; Wagner et al., 2021) and contextual factors of sustainable entrepreneurial ecosystems (Bischoff, 2021; DiVito and Ingen-Housz, 2021; Pankov et al., 2021). Despite such progress, more research can be done to understand the distinct configurations of key elements within the entrepreneurial ecosystem and their interdependencies which can help to facilitate sustainable entrepreneurship (Bischoff and Volkmann, 2018).

Moreover, the entrepreneurial ecosystems literature has several weaknesses. The entrepreneurial ecosystem concept remains under-theorised and there are several research gaps. First, despite the list of attributes of the entrepreneurial ecosystem and its possible relationships, the concept remains tautological as the entrepreneurial ecosystem is defined by those which exemplify successful entrepreneurship and that there must be a strong entrepreneurial ecosystem when successful entrepreneurship is present. Isenberg (2011) argues that there are six key components of an entrepreneurial ecosystem. They are markets, policy, human capital, finance, culture and supports. Spigel (2017) later categorised the entrepreneurial ecosystem into three main attributes: i) cultural attributes (supportive culture, histories of entrepreneurship), ii) material attributes (policies, universities, infrastructure, open markets, support services), and iii) social attributes (networks, worker talent, mentors and role models, investment capital). Current

frameworks tend to list down factors without strong explanations of a causal relationship between the proposed factor and the success of the entrepreneurial ecosystem. The framework also does not offer any insight into the interdependent relationship of the different factors and the corresponding effect on entrepreneurship.

It is also widely accepted that the different components of an entrepreneurial ecosystem do not exist in isolation. The different components develop in tandem, and they interact with one another to give rise to entrepreneurial activity. Spigel (2017) suggests that there can be multiple configurations of entrepreneurial ecosystems where the different components interact with one another differently. In his comparative study of the Calgary and Waterloo's entrepreneurial ecosystems, Spigel (2017, p.67) argues that material attributes are "unlikely to succeed if they are not underpinned by complementary social and cultural attributes". However, it remains unclear as to how these attributes strengthen over time or how these interdependent relationships are fostered.

Secondly, there is a lack of knowledge on the context in which entrepreneurial ecosystems develop (Mack and Mayer, 2016). It appears that the strong role of the state evident from its policies towards developing the entrepreneurial ecosystem in many contexts goes against its conceptual underpinnings. Stam (2015) suggests that entrepreneurs occupy a central position in the entrepreneurial ecosystem and their actions contribute to the sustainability of successful entrepreneurial ecosystems. Intrinsic to the entrepreneurial ecosystem is its relatively self-organised and self-sustaining nature, thereby decreasing the role of the state. Likewise, Isenberg (2016) maintains that policymakers are under the wrong impression that entrepreneurial ecosystems can be purposively "created". Instead, policy interventions are thought to lead to adverse effects and disrupt the equilibrium of the entrepreneurial ecosystem (Colombo et al., 2019). In spite of these theoretical arguments, policymakers have taken up a key role in developing entrepreneurial ecosystems in many different contexts (Feldman and Lowe, 2018). Some scholars argue that state intervention have been key to developing entrepreneurial ecosystems (Klingler-Vidra and Pacheco Pardo, 2020; Pacheco Pardo and Klingler-Vidra, 2019) through various ways which include adding resources to the ecosystem (Spigel and Harrison, 2018).

Nevertheless, entrepreneurship studies that understand the interactions between government and the entrepreneurial ecosystem are relatively limited. Despite its strong policy appeal, there remains a lack of literature that critically examines the entrepreneurial ecosystems concept from a policy perspective (Brown and Mawson, 2019). In particular, there exists little

research that explores the nature of public policy approaches used under the umbrella of the entrepreneurial ecosystems concept (Alvedalen and Boschma, 2017). There is still a lack in discourse on the features and the role of policy in the development of the entrepreneurial ecosystem and innovative startups. As a result, it remains unclear how policymakers should best intervene in the entrepreneurial ecosystem to promote entrepreneurial activity. More research is needed to know about the features of government policy in the entrepreneurial ecosystem and on the interactions between government policy and the growth of the entrepreneurial ecosystem.

Thirdly, most knowledge on the entrepreneurial ecosystem is conceptualised based on the cases of developed Western nations where the role of the state in guiding the economy is often kept to minimal levels. In a study on entrepreneurial ecosystems research published in 54 leading business and entrepreneurship journals from 2000 to 2017, Chen et al. (2020) found out that out of 50 articles that examined the entrepreneurial ecosystems, only about 10% focused on Asian countries as their sample. In particular, there was no study that examined the entrepreneurial ecosystem of the Asian Tiger economies (eg. Singapore, South Korea and Taiwan) in detail. There is a recognised role for Western governments in promoting entrepreneurship via interventions such as building infrastructure and supporting a culture of risk-taking within the ecosystem (Spigel, 2017). However, in the East Asian economies, the government often plays a far bigger role. Instead of simply being a "facilitator" in the entrepreneurial ecosystem, the government may be an active force that "can determine the success or failure of a venture" (Chen et al., 2020, p.380).

More research needs to be directed towards states with a history of strong state intervention and development policies, such as the East Asian economies where the state has adopted a prominent role in guiding the economy. The role of the state proves to be significant in achieving the remarkable economic success experienced by the East Asian economies in the 1960s-70s (Amsden 1989; Wade 2004; Johnson 1982). The state carried out a series of interventionist policies which included protecting infant industries, nationalising land, and reducing labour prices. Therefore, more studies are also needed to understand the entrepreneurial ecosystem in other non-Western economies, especially those with a strong history of government intervention, such as the East Asian economies.

1.2 Research question

The previous section discussed the entrepreneurial ecosystems literature and the current research gaps in existing studies. I show that there is a lack of attention paid to the role of the state as a key

actor in the entrepreneurial ecosystem. Furthermore, the specific components of the entrepreneurial ecosystem such as culture, are under-conceptualised. Overall, the key research gaps in the current literature form the premise and motivations for this thesis. The two main research gaps are summarised in Table 2.

Table 2. Summary of Research Gaps

No.	Research Gap
1	There is little understanding on how particular attributes of the entrepreneurial ecosystem affect entrepreneurship.
2	There is no systematic understanding on the state's role in the entrepreneurial ecosystem and the mechanisms in which government policy affects entrepreneurial ecosystem growth.

The dissertation aims at bridging these research gaps and therefore answers the main research question: What is the role of the state in the entrepreneurial ecosystem and how does the entrepreneurial ecosystem lead to the creation of innovative startups? This is done through three papers with each paper answering the following sub-questions:

1) What are startup-centric innovation policies? (Paper One)

2) What are the dimensions of government policies used and how do these policies lead to the development of the entrepreneurial ecosystems? (Paper Two)

3) How has the culture changed in Singapore's entrepreneurial ecosystem from 2000s to 2020 and how does it affect innovative startup creation? (Paper Three)

The aim of this study is to develop a framework to understand the interactions between the state and the entrepreneurial ecosystem as well as the relationship between the entrepreneurial ecosystem and entrepreneurship activity. The three sub-questions are formulated to address the two research gaps identified in the literature.

The first and second sub-questions aim to bridge Research gap 2. Sub-question 1 bridges Research Gap 2 by theorising the policy type that governments around the world implement to promote the growth of innovative startups. This theorisation is crucial to gain an initial understanding of what role governments play within the entrepreneurial ecosystem as well as the impact public policies have on ecosystem growth. With the growing interest and prominence of the entrepreneurial ecosystem framework, there is an increasing body of research on public policies aimed at promoting innovative startups within the ecosystem (Acs et al., 2016; Autio and Rannikko, 2016). However, existing studies tend to focus on the firm's lifecycle (Audretsch et al., 2020), the rationale of such policies (Edler and Fagerberg, 2017; Mazzucato, 2013) and the types of instruments used (Lerner, 2009). The study in sub-question 1 draws on industrial policy and innovation policy literature as well as entrepreneurial ecosystem literature to theorise this new policy type which governments implement to promote innovative startups as part of the entrepreneurial ecosystem. The study proposes the concept of startup-centric innovation policy and shows that this new policy type can be understood via its four main attributes (firm age, type of firm, target audience, and instruments).

The second sub-question bridges Research Gap 2 by investigating how government policy affects the entrepreneurial ecosystem's growth. An increasing body of work have examined the role of the state within the entrepreneurial ecosystem (Motoyama and Knowlton, 2017; Wei, 2022). However, existing studies have yet to systematically study government policy implemented for entrepreneurial ecosystem growth as well as understand the mechanisms in which government policy affects ecosystem growth. This study combines the institutional framework (Scott, 1995; 2001) and the entrepreneurial ecosystem coordinative functions framework (Brown and Mason, 2017) to structure the investigation of government policy and how it affects the ecosystem growth. It demonstrates that government policies implemented to foster ecosystem growth can be understood in terms of four main institutions (regulative, normative, cognitive, and conducive). At the same time, policies targeting different institutions foster different ecosystem dynamics which affect the coordinative functions of entrepreneurial ecosystem, in turn affecting the growth of the ecosystems. Overall, the study supports the top-down approach of governing entrepreneurial ecosystems (Audretsch and Belitski, 2017; Lehmann and Menter, 2017) and contributes to the empirical study of entrepreneurial ecosystems by investigating two Asian entrepreneurial ecosystems (Singapore and Hong Kong) when existing studies tend to focus on Western cases.

Finally, the third sub-question aims to bridge Research Gap 1. Sub-question 3 investigates the relationship between cultural change within an entrepreneurial ecosystem and the growth of innovative entrepreneurship. An increasing body of research on entrepreneurial ecosystems have investigated culture as a key attribute of successful ecosystems (Feld, 2012; Isenberg, 2011; Mason and Brown, 2014; Spigel, 2017). Yet, culture within the entrepreneurial ecosystem remains under-theorised and current literature tend to study a positive entrepreneurial culture in descriptive terms such as high acceptance of failure and high social status of entrepreneurs (Mason and Brown, 2014; Feld, 2012). More knowledge is needed on how the culture within an ecosystem leads to the growth of innovative startups (Stam, 2015). This study draws on Bourdieu's (1986) cultural capital conceptual framework to examine cultural change within Singapore's entrepreneurial ecosystem and its effect on innovative entrepreneurship. This study demonstrates that culture within the entrepreneurial ecosystem can be understood in terms of embodied cultural capital (entrepreneurial experiences), objectified cultural capital (entrepreneurial spaces, media), and institutionalised cultural capital (entrepreneurial education). The different types of cultural capital affect an individual's disposition towards innovative entrepreneurship by promoting entrepreneurial identity, fostering societal norms and values, and building up entrepreneurial capabilities, in turn leading to an increase in innovative entrepreneurial activity.

As a whole, while the dissertation is a collection of three independent research articles, the unifying concept across the three papers is the entrepreneurial ecosystem. Aside from the focus on the entrepreneurial ecosystem, the three articles in chapters 2, 3, and 4 are also connected by the common thread of the role of the state. Specifically, all three articles aim to increase our understanding of government policy used to promote innovative startups. The articles are arranged sequentially where this PhD study first, seeks to understand *what* constitutes government policy used to promote innovative startups (Chapter 2) and second, to understand *how* government policy promotes innovative startups (Chapters 3 and 4).

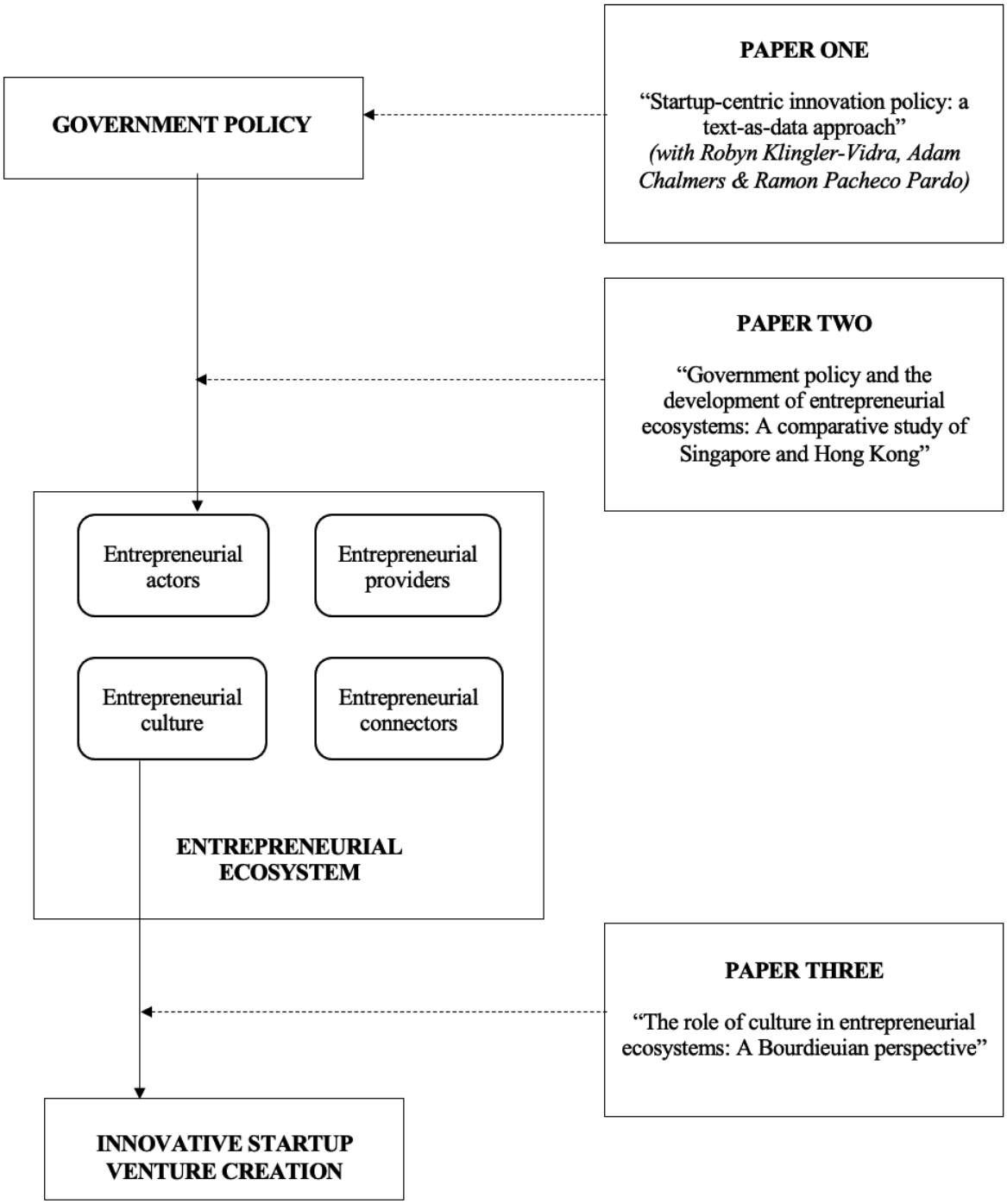
Chapter 2 is a theoretical contribution towards understanding what constitutes the government policy used to promote innovative startups, which is what we call startup-centric innovation policy. The article contends that startup-centric innovation policy is a contemporary means of industrial policy, one focused on promoting the growth of innovative startups, aimed at driving economic development. However, current literature remains unclear on what exactly constitutes this type of policy aimed at promoting the growth of innovative startups and how one can identify them. The article theorises startup-centric innovation policy in terms of four main attributes: firm age, type of firm, target audience, and instruments used. By doing so, the article

advances conceptual clarity on this growing policy set as more governments around the world implement policies targeting the growth of innovative startups. With the understanding of what constitutes startup-centric innovation policy and how we can identify such policies implemented to promote innovative startups in Chapter 2, Chapter 3 proceeds to investigate how can such government policies lead to the growth of innovative startups. With the entrepreneurial ecosystem being regarded as a crucial factor leading to the creation of innovative startups, the article in chapter 3 uses Singapore and Hong Kong as two main case studies to identify the mechanisms in which government policy affects the development of entrepreneurial ecosystems. Taken together, Chapter 2 theorises and identifies the attributes of government policy aimed at promoting innovative startups while Chapter 3 investigates how government policy help to promote innovative startups via affecting the growth of the entrepreneurial ecosystem.

With the findings on how government policies stimulate key ecosystem dynamics and contribute to the development of the entrepreneurial ecosystem by affecting key ecosystem coordinative functions in Singapore and Hong Kong shown in Chapter 3, Chapter 4 zooms in on one key ecosystem function (entrepreneurial culture) and study how it leads to the growth of innovative startups. This follows from the findings in Chapter 3 where we see that government policy affected the entrepreneurial culture in Singapore and that culture may not be as rigid and unchangeable as assumed in the literature (Parto, 2005; Roland, 2004). Specifically, with the understanding that government policy affected the culture in Singapore's entrepreneurial ecosystem, the article in Chapter 4 studies how such a cultural change within the ecosystem affects the growth of innovative startups. The framework linking the three papers can be visualised in Figure 1.

The dissertation which comprise three papers draws on three main empirical material (i) over 300 policy documents from governments around the world obtained from "Startup Nation Atlas of Policies" (SNAP), a database initiated by Global Entrepreneurship Network (GEN), (ii) 20 semi-structured interviews conducted in Hong Kong and 14 semi-structured interviews conducted in Singapore, and (iii) government reports in Singapore which included 5-year plans and Annual Reports of the Standards, Productivity, and Innovation Board (SPRING) Singapore (later renamed as Enterprise Singapore) as well as government reports in Hong Kong which included the Chief Executive's Policy Addresses and the Annual Reports of InvestHK.

Figure 1 Framework for three papers



1.3 Structure and contributions

Collectively, the three papers build on existing work within the entrepreneurial ecosystems literature and address current research gaps. The first paper is a theoretical piece that positions startup-centric innovation policy in the wider literature on industrial policy and conceptualise startup-centric innovation policy in terms of four key attributes – age/newness, type of firm, target audience, and instruments used. The second paper investigates the role and influence of government policy on the development of the entrepreneurial ecosystem in terms of its coordinative aspects and underlying ecosystem dynamics. Finally, the third paper examines cultural change in the entrepreneurial ecosystem and its role on startup venture creation by drawing from Bourdieu's practice theory. The three papers are summarised in Table 3 and elaborated on in the following.

Table 3: Overview of chapters in the dissertation			
Chapter and submission status	**Research question**	**Method and data**	**Findings**
Chapter 2: "Startup-centric innovation policy: a text-as-data approach" *(with Robyn Klingler-Vidra, Adam Chalmers & Ramon Pacheco Pardo)* Under review in *Review of International Political Economy*	What is startup-centric innovation policy?	Text-as-data methods (n-grams) Over 300 policy documents from "Startup Nation Atlas of Policies" (SNAP), a database initiated by Global Entrepreneurship Network	Conceptualisation of the key attributes of startup-centric innovation policy in terms of age, type of firm, target audience, and instruments used
Chapter 3: "Government policy and the development of entrepreneurial ecosystems: A comparative study of Singapore and Hong Kong" Under review in *Research Policy*	What are the dimensions of government policies used and how do these policies lead to the development of the entrepreneurial ecosystems?	Documentary research 14 semi-structured interviews in Singapore and 20 semi-structured interviews in Hong Kong	Government policies affect the four coordinative aspects by stimulating underlying ecosystem dynamics An "entrepreneurial ecosystem policy mix" is needed to promote the development of the ecosystem
Chapter 4: "The role of culture in entrepreneurial ecosystems: A Bourdieuian perspective" Major revision in *Entrepreneurship and Regional Development*	How has the culture changed in Singapore's entrepreneurial ecosystem from 2000s to 2020 and how does it affect innovative startup creation?	14 semi-structured interviews in Singapore	Summarise cultural changes within the entrepreneurial ecosystem in terms of embodied, objectified, and institutionalised cultural capital Propose mechanisms to explain how cultural capital can lead to startup venture creation

Chapter Two presents the first paper which is titled "*Startup-centric innovation policy: a text-as-data approach"*. Together with my co-authors, Robyn Klingler-Vidra, Adam Chalmers, and Ramon Pacheco Pardo, we propose a conceptualisation of the key attributes of startup-centric innovation policy. Despite the spread of "entrepreneurial state" (Mazzucato, 2013) activities, political economy research has yet to systematically articulate a conceptualisation of startup-centric policy, either as a form of industrial policy (as emanating from developmental state scholarship) or in concrete innovation policy terms (as originating from national system of innovation research). The absence of a clear definition of this policy type creates gaps in knowledge of the range of policies employed as well as their performance. The paper builds on existing work on the role of the state in the entrepreneurial ecosystem by elucidating what constitutes startup-centric innovation policy through a conceptualisation and operationalisation of the policy type.

Nascent studies have attempted to conceptualise startup-centric innovation policy in innovation policy types and in terms of firm characteristics. Notably, Audretsch et al. (2020), Lundstrom and Stevenson (2005) and Isenberg (2011) offer depictions of "innovative startup incentives" in terms of a firm's lifecycle, detailing measures according to which stage of growth they target. Schott and Steinmueller (2018) and Edler and Fagerberg (2018) implicitly place startup support within the 'national innovation system' (NIS) category of innovation policy, distinguishing it from invention focused (e.g., research and development) and mission-oriented policies. Others, such as Pacheco Pardo and Klingler-Vidra (2019), conceptualise startup-centric innovation policy as a form of NIS distinguished by how a range of instruments used, such as funding, taxes, and regulatory changes, strive to increase the quality and quantity of high-growth, technology-centric entrepreneurial activity. But there remains a need for an operationalisation of what constitutes these entrepreneurs and high-growth activities that policies are targeting. To do so, the paper studies startup-centric innovation and policy and delineates key attributes of "startups" in terms of their age, or newness (e.g., when they were founded) and technological nature as well as the target beneficiaries and policy instruments that comprise startup-centric innovation policy.

Chapter Two's contributions lie in its advancement of conceptual clarity and empirical engagement in the context of startup-centric innovation policies. Existing literature has defined startup policy based on several categorisations, such as the life cycle of the firm (Audretsch et al., 2020), the type of entrepreneurship (novel vs routine) the startup pursues (Acs et al., 2016), the aims of the policy (Roman et al., 2013), and policy instruments of the policy (Pacheco Pardo and

Klingler-Vidra, 2019). Given the absence of a widely accepted definition of startup-centric innovation policy, this paper is among the first to systematically discern the key dimensions of the concept. The study does this by situating startup-centric innovation policy within the broader innovation and industrial policy types, as delineated across political economy and innovation studies scholarship (Kennedy, 2016; Kim, 2019), followed by conceptualising and operationalising startup-centric innovation policy into four key attributes. This is done by first specifying the attributes of startup-centric innovation policy as delineated in state-of-the-art literature, and then testing the occurrence of these attributes in the GEN Atlas policy database consisting of 298 policies from 192 countries. The study finds that startup-centric innovation policy: (i) targets firms that are up to five years old; (ii) does not necessarily focus on the technological frontier; (iii) targets wider entrepreneurial ecosystem actors, particularly accelerators, incubators, and universities; and (iv) uses instruments that strive to enhance economic, human, physical, and social capital. With the operationalisation of the concept into key attributes, the paper advances knowledge on what startup-centric innovation policy is and what they do and contributes to shaping knowledge on how industrial policy is being transformed in a world characterised by complex technological change and emerging grand challenges.

Chapter Three presents the second paper which is titled "*Government policy and the development of the entrepreneurial ecosystem: A comparative case study of Singapore and Hong Kong"*. The second paper is a single-authored paper, and the paper investigates how government policy affects the development of the entrepreneurial ecosystem. This is done by a comparative case study of Singapore and Hong Kong using semi-structured interviews as the primary data, combined with secondary data such as press releases and government reports.

While strong support from the government proves to be crucial for promoting entrepreneurial activity (Huggins and Williams, 2011; Parker, 2008), studies that understand the interactions between government and the entrepreneurial ecosystem are relatively limited (Spigel et al., 2020). Nascent work that studied the role of the state in the entrepreneurial ecosystem include the effects of government sponsorship (Motoyama and Knowlton, 2017), the role of public and social services (Wei, 2022), the role of public cluster policy (Lehmann and Menter, 2018) and the role of the Korean developmental state in the entrepreneurial ecosystem (Pacheco-Pardo and Klingler-Vidra, 2019). More studies are thus needed to explore the role of government in high-growth entrepreneurship based on the entrepreneurial ecosystem perspective, especially on investigating how government policy influences the development of the entrepreneurial ecosystem. The paper makes a step forward in understanding the role of the state in entrepreneurial

ecosystems by studying how government policy affects the development of the entrepreneurial ecosystems in two East Asian economies: Singapore and Hong Kong. The paper also adds on to existing empirical material on entrepreneurial ecosystems which is currently focused on Western case studies by examining two key entrepreneurial ecosystems in Asia.

Given the paper's focus on advancing theory on the role of governments in the development of entrepreneurial ecosystems and empirical engagement in the context of East Asian entrepreneurial ecosystems, Chapter Three strives to advance recent work published such as Kapturkiewicz's (2021) work on varieties of entrepreneurial ecosystems and the theorising of policy mix as in Flanagan et al (2011). In addition, the study offers deeper insights into the role of state involvement in entrepreneurial ecosystems, building on Wang's (2018) study on government intervention and innovation in Singapore and Hong Kong. Existing literature suggest that the state has a key role to play in developing entrepreneurial ecosystems (Feldman and Lowe, 2018; Klingler-Vidra and Pacheco Pardo, 2020). Studies on government policy tend to focus on delineating the types of entrepreneurship policies governments implement (Acs et al., 2016; Audretsch et al., 2020) and the impact of government policies on entrepreneurship (Autio and Rannikko, 2016; Hottenrott, 2020; Zhao and Ziedonis, 2020).

Using the cases of Singapore and Hong Kong as two typical cases of the entrepreneurial state whereby the state plays a considerable role in orchestrating policies for economic development (Seawright and Gerring, 2008), this paper adds on to existing knowledge by bridging knowledge on government policies and the entrepreneurial ecosystem. Drawing from the concept of entrepreneurial ecosystem dynamics (Brown and Mason, 2017) and institutional theory (Scott, 1995; 2001), this paper shows how government policies lead to the development of the entrepreneurial ecosystem by affecting its coordinative aspects. The paper finds that government policies promote the development of the entrepreneurial ecosystem by stimulating key ecosystem dynamics such as blockbuster entrepreneurship, spatial dynamics, ecosystem interactions, funding, and entrepreneurial mindset. Additionally, the paper also finds that government policies appear to take the form of a "policy mix" where a mix of regulative, normative, cognitive, and conducive policy instruments are combined. Different policy instruments affect different coordinative aspects of the entrepreneurial ecosystem. In addition to advancing the theoretical grounding for the role of the state in the entrepreneurial ecosystem, this paper also offers policymakers actionable insights in terms of the types of policy instruments they can consider when trying to stimulate key ecosystem dynamics to target specific coordinative aspects of the entrepreneurial ecosystem.

Chapter Four presents the third paper which is titled *"The role of culture in entrepreneurial ecosystems: A Bourdieuian perspective"*. The third paper is a single-authored paper, and it clarifies and studies how culture within the entrepreneurial ecosystem leads to entrepreneurship (Stam, 2015; Stam and Spigel, 2017) by studying cultural change in Singapore's entrepreneurial ecosystem. Early research on entrepreneurial ecosystems has often delineated culture a key element of the ecosystem (Feld, 2012; Isenberg, 2011; Spigel, 2017). This typically includes a list of positive cultural traits for entrepreneurship, such as tolerance for risk-taking, acceptance of failure, and high social status of entrepreneurs (Mason and Brown, 2014; Feld, 2012; Spigel, 2017). Although the literature has delineated culture as a key component in the entrepreneurial ecosystem, little has been done to study how we can theorise culture as a concept and explain how culture can lead to an uptake in entrepreneurship. Recent works have begun to study how the culture of an entrepreneurial ecosystem can affect entrepreneurship (Donaldson, 2020; Spigel, 2017). The paper builds on existing work and by drawing from Bourdieu's (1986, 1977) concept of cultural capital, the paper theorises culture in the entrepreneurial ecosystem and suggests mechanisms on how culture as a key component of the ecosystem, promotes startup venture creation.

Chapter Four's main contributions lie in advancing conceptual clarity and empirical engagement of culture within the entrepreneurial ecosystem. Existing literature on entrepreneurial culture tend to describe culture within the entrepreneurial ecosystem based on successful cases (Feld 2012, Isenberg, 2011). The culture of an entrepreneurial ecosystem is typically referred to as positive societal norms such as tolerance for risk-taking, acceptance of failure, and high social status of entrepreneurs (Mason and Brown, 2014; Feld, 2012) and is often operationalised by using the number of new firms being set up (Stam and van de Ven, 2021). Given that the connections between the culture of the entrepreneurial ecosystem and the resultant entrepreneurial activity remain unclear (Spigel, 2017), this paper offers new insights on how the culture of an entrepreneurial ecosystem changes over time and provides a framework to connect culture in the entrepreneurial ecosystem with the act of entrepreneurship. The article does this by building on recent work published such as Spigel (2013)'s theorising of entrepreneurial culture, the empirical study of Asian entrepreneurial ecosystems, as in Chen et al. (2020), and the works on entrepreneurship as practice as in Claire et al. (2020) and Thompson et al. (2020). Specifically, the study adopts a Bourdieuian approach to examine cultural change in Singapore's entrepreneurial ecosystem from the early-2000s to 2020 to illustrate exactly how culture affects entrepreneurship uptake. Singapore, a typical case (Seawright and Gerring, 2008) that

experienced a significant transformation in its entrepreneurial landscape (Motoyama and Watkins, 2014), provides crucial insights regarding the impact of entrepreneurial ecosystem culture on the adoption of entrepreneurship. Through 14 interviews with key stakeholders in Singapore's entrepreneurial ecosystem, the study finds that culture in the entrepreneurial ecosystem can be understood in terms of cultural capital such as entrepreneurial experiences, entrepreneurial spaces, media, and entrepreneurial education. These cultural capital (resources) in turn affects an individual's disposition towards undertaking entrepreneurship by affecting (i) entrepreneurial identity, (ii) societal norms and values, and (iii) entrepreneurial capabilities.

1.4 Conclusion

Overall, the dissertation examines the political economy of innovative startups through three articles which respectively conceptualises startup-centric innovation policy, investigates the influence of government policy on the entrepreneurial ecosystem coordinative aspects and their underlying ecosystem dynamics, and examines the role of cultural change in the entrepreneurial ecosystem and its influence on startup venture creation. The three papers which form the dissertation are presented in the subsequent three chapters. The final chapter concludes the dissertation.

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CHAPTER TWO

STARTUP-CENTRIC INNOVATION POLICY: A TEXT-AS-DATA APPROACH

Abstract: Governments around the world implement a variety of policy initiatives to promote startups to boost innovation and economic growth. Yet we lack a sufficiently focused definition of what, precisely, constitutes startup-centric innovation policy. This paper identifies four main attributes of startup-centric innovation policy as delineated in state-of-the-art literature, and then uses text-as-data techniques to test the appearance of these attributes in a global database of 298 policies from 192 countries. We find that startup-centric innovation policy: (i) targets firms that are up to five years old; (ii) does not necessarily focus on the technological frontier; (iii) targets wider entrepreneurial ecosystem actors, particularly accelerators, incubators, and universities; and (iv) uses instruments that strive to enhance economic, human, physical, and social capital. With our conceptualisation of key attributes of startup-centric innovation policy, we strive to offer greater the analytical clarity around how this growing policy set fits within the broader industrial and innovation policy types. We also aim to offer policymakers actionable insight into how to operationalise startup-centric innovation policy.

Keywords: Entrepreneurship, Government, Innovation policy, Startup

2. Introduction

High-growth startups are regarded as a key engine of innovation, and, as a result, a country's economic development and growth (Audretsch et al., 2020; Sedláček and Sterk, 2017). Governments globally have implemented policies aimed at boosting startup-centric innovation (Autio and Rannikko, 2016; Klingler-Vidra and Wade, 2020). Despite the spread of "entrepreneurial state" (Mazzucato, 2013) activities, research has yet to systematically define this growing policy, either as a form of industrial policy (emanating from developmental state scholarship) or in innovation policy terms (originating from national systems of innovation research).

Nascent studies have, however, attempted to conceptualise startup-centric innovation policy in terms of wider policy types and identified some target firm characteristics. Audretsch et al. (2020) offer depictions of "innovative startup incentives" in the context of a firm's lifecycle, detailing measures according to which company growth stage they target. Schot and Steinmueller (2018) and Edler and Fagerberg (2017) implicitly place startup support within the 'national innovation system' (NIS) category of innovation policy, distinguishing it from invention-focused (e.g., research and development) and mission-oriented policies. Others, such as Pacheco Pardo and Klingler-Vidra (2019), conceptualise startup-centric innovation policy as a form of NIS distinguished by how a range of instruments used, like funding and regulatory changes, strive to increase the quality and quantity of high-growth, technology-centric entrepreneurship. While this line of research offers crucial insights into some attributes of this policy arena, there remains a need for an operationalisation of what constitutes these entrepreneurs and high-growth activities that this brand of policy is targeting. Additionally, there is a need to better place this within the context of industrial policy, which has been depicted as boosting manufacturing sector—rather than digital—capabilities.

The political economy literature has focused on the rationale for the entrepreneurial state (Mazzucato, 2013; Tiberghien, 2007) in fostering the technological upgrading capabilities of small and medium enterprises (SMEs) (Breznitz, 2007; Martin and Scott, 2000). The emphasis has been on analyzing the state apparatus and instruments, rather than specifying what constitutes the firms, individuals, or industrial activities being targeted. Similarly, debates on the relationship between government policies and national innovation performance have often asked how the state should intervene to foster venture ecosystems (Lerner, 2009), firm coordination (Vogel, 2018), or boost the capabilities of firms and industries (Wong, 2001). This body of research offers insights into the "menu" of policies available (Klingler-Vidra, 2014), but has not yet shed light on how

the characteristics of either startups or innovation are articulated in this policy domain. Research has also described specific policy initiatives to assess their performance (Lerner, 2009), offering rich insights into the merits of instruments (e.g., tax incentives), but without delineating how the target beneficiaries are operationalised.

Our paper strives to make three contributions. First, we offer a concrete conceptualisation of the startup-centric innovation policy type in political economy scholarship. Consistent with state-of-the-art literature (Audretsch et al., 2020), we define startup-centric innovation policy as *purposive public action to support the creation and scaling up of new, high-growth, innovative firms*. The thrust of our contribution is in specifying the component parts of the definition; "creation and scaling up", "new", "high-growth", and "innovative". To do so, we delineate key attributes of startups in terms of their age/newness and their technological nature. Second, we draw together disparate bodies of scholarship to conceptualise startup-centric innovation policy in wider analytical terms. We engage innovation studies, neo-Schumpeterian literature, and political economy literature. To do this, we systematically review state-of-the-art scholarship[1] to identify the attributes that are understood to comprise the target beneficiaries and policy instruments. Third, based on this literature review, we develop a novel dictionary for studying startup policy (Edler and Fagerberg, 2017). Our text-as-data techniques (Baturo et al., 2017; Juhász et al., 2020; Prufer and Prufer, 2020) help us test for what language is used to articulate startup-centric innovation policy. Using our n-gram dictionary, we study the use of the attributes and n-grams within the text descriptions and structured categories for all 298 policies included in the Global Entrepreneurship Network (GEN) "Atlas"[2] policy database as of April 2022.

The paper is organised as follows. The next section elaborates our conceptualisation of industrial policy, innovation policy, and national innovation system policy. It then places startup-centric innovation policy in this broader policy context and delineates state-of-the-art conceptualisations and typologies emanating from innovation studies and political economy literature. Section 2.2 discusses the data and methods, and section 2.3 presents the results of our empirical text-as-data test. Section 2.4 discusses the results and section 2.5 concludes the paper.

2.1 Theory: From industrial policy to startup-centric innovation policy

[1] See, for example, Audretsch et al., 2020; Klingler-Vidra and Wade, 2020; Pacheco Pardo and Klingler-Vidra, 2019. The full list of academic articles that we hand-coded is available in the Appendix.

[2] For more information on the database, see: https://www.genglobal.org/atlas. Our use of this database is in line with recent studies, that have also used this resource. Notably, a sample of approximately 30 policies included in this Atlas database informed the Audretsch et al. (2020) elaboration of innovative startup policy initiatives.

2.1.1 Industrial policy

The use of industrial policy to achieve rapid economic growth is widely researched in political economy studies of post-World War II (WWII) Western Europe and the East Asian developmental state.[3] Bianchi and Labory (2006) distinguish between three phases in Western European industrial policy: (1) strong state interventionism from 1950s-1970s; (2) market-led approaches in 1980s-1990s; and (3) pragmatic combination of state interventionism and market-led approaches from 2000s onwards. Scholars studying Western European industrial policy generally note that it was the preferred approach for policymakers and business leaders seeking to rebuild the European economy in the aftermath of the destruction caused by WWII (Bianchi and Labory, 2019; Foreman-Peck and Hannah, 1998). In East Asia, Johnson (1982) established the concept "developmental state" through studying post-war Japan's economic growth. He argued that it was the result of effective industrial policy, evident from the key role the Ministry of International Trade and Industry (MITI) played in setting the direction and organising industry collaboration. Subsequent work expanded on Johnson's findings, showed that industrial policy was a key factor explaining the impressive economic growth experienced by other East Asian economies (Amsden, 1989; Woo-Cummings, 1999).

The underlying objective of industrial policy aimed at economic development is to achieve structural transformation by upgrading firms' productive and technological capabilities (Chang, 1994; Wade, 1990). Recent research revealed that the persistence of low technological capabilities is a key explanation for the "middle-income trap" (Paus, 2020), highlighting the important role of industrial policy in fostering technical capacity upgrading to enable economic development. Research on these regions underscores that state support for the private sector was driven by the need to (re)industrialise or achieve catch-up development. This created a need for long-term planning, targeting of specific industries, and strategic credit allocation.

A key attribute of post-war industrial policy in many countries was firm size, given that *large industrial conglomerates*, like the "chaebol" in South Korea and "keiretsu" in Japan, were targeted.[4] Aligned with economic theory established by Alexander Hamilton and Fredrich List, industrial policy instruments helped nurture these domestic firms in infant industries by allowing them to develop productive capabilities before being exposed to global market competition

[3] Industrial policy was also used in other parts of the world, such as Latin America, albeit with less success, due to reasons such as global economic conditions and the different development strategies used (Etzkowtiz and Brisolla, 1999).

[4] There were other economies, such as Taiwan, where the government provided support and focused on developing SMEs instead of large firms (Wade, 1990).

(Amsden, 1989; Chang, 2002). In the East Asian developmental state context, research showed that the state engaged in "getting prices wrong" through measures like tariff barriers and long-term subsidies to selected industries such as heavy and chemical industries (Wade, 1990). This was coupled with the state's ability to discipline the private sector where subsidies were given contingent on performance, productivity, and the pursuit of specific activities, notably exporting. Industrial policy was also key in technological upgrading in world-frontier industries like semiconductors and personal computing (Anchordoguy, 2005).

Large firms in post-war Japan and Korea then benefited from the combination of market protection and state-directed (but exports-linked) credit so that they could finance their costly technological upgrading activities. In Germany, the state focused on creating the conditions for the private sector to thrive. Big firms surviving WWII and operating in sectors central to the (re)industrialisation of Germany, such as chemicals, coal, and steel, benefited from targeted support (Feldenkirchen, 1998). Additionally, family-owned, middle-sized firms (*Mittelstand*) received bank credit and governmental support to develop products for exporting and to integrate themselves in the supply chains of big firms (Pahnke and Welter, 2019). This way, the state indirectly supported large firms via its support to the *Mittelstand*. In France, industrial policy's focus was on the so-called "industries of the future" that should propel economic growth. The state nurtured and protected national champions in sectors like nuclear energy, space industry, or telecommunications, providing funding and protectionism against foreign competitors (Cohen, 2007). There was a need for scale in these sectors, which is why the upgrading capacity of big firms received state support.

Both Western European industrial policy and the East Asian developmental state apparatus enabled technological upgrading through their organising of market actors, within what we would now call a national innovation system (NIS). The NIS involves the state designing industrial policy that builds systemic technological capabilities through the organisation of activities like public-private R&D alliances (Mathews, 2002) or technology transfer (Mowery and Oxley, 1995). Alliances brought together the government, public research institutes, trade associations, and private firms, as in Korea (Amsden, 1989), and saw technologies developed by public research institutes later commercialised by private firms, as in Finland (Yla-Anttila and Palmberg, 2007). The government was involved in initiating alliances, providing funding and infrastructure support, while private firms entered partnerships with public research institutes and shared R&D risk. As development became more "compressed" (Whittaker et al., 2020) due to structural changes in the global economy, and domestic economies achieved crucial positions in

global technology markets, policies became more horizontal and less industry- and technology specific (Rodrik, 2004).

2.1.2 Innovation policy

Originating from innovation studies and economic geography scholarship, research on innovation policy examines state efforts to nurture innovation through key instruments (Lundvall and Borrás, 2005). The literature describes three types of innovation policy: (1) invention- or R&D-focused, (2) NIS, and (3) transformational or mission-oriented (Edler and Faberberg, 2017; Schot and Steinmueller, 2018). Innovation is regarded as having a systemic nature (Lundvall, 1992) and the NIS concept encapsulates this view. One of the frequently used definitions is from Freeman (1987, p.1), where the NIS refers to "the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify, and diffuse new technologies". The main institutions discussed in the NIS literature are government agencies, private firms (including entrepreneurs and incumbent firms), research institutes, technology transfer offices, and universities (Cooke et al., 1997; Lundvall, 1992). Speaking to the importance of linkages across a system, Chesbrough (2003) coined the term "open innovation" to signify how, by the beginning of 21st century, innovation processes had shifted away from the traditional "closed model" whereby innovation only takes place within the firm's boundaries. Instead of internally performed R&D and go-to-market strategy, in open innovation systems, external institutions such as startups act as resources that contribute to the competitive positioning of an incumbent firm (Dahlander et al., 2021).

Distinct from research on industrial policy that targeted specific large firms or technologies, NIS policies are conceived of as predominantly horizontal interventions to build systemic capacity (Lall and Teubal, 1998). NIS policy strives to promote innovation across sectors and is broadly concerned with creating an environment out of which "winners" may arise, rather than supporting specific firms (Bailey et al., 2019). Scholarship on the NIS is not concerned with one specific firm type—rather, the aim is to upgrade the capabilities of a range of actors and firm types. Focusing on large industrial conglomerates, Freeman (1987) details how large Japanese firms achieved flexibility in innovation because of extensive networks fostered with sub-contractors and suppliers. Lundvall (2002) studied how cooperation amongst Danish firms and knowledge institutions contributed to product innovation. As these examples illustrate, NIS policies emphasise the aim of enhancing coordination and linkages between different actors to boost capabilities (Howlett, 2005).

NIS policies are thus concerned with building "hardware" like research institutions and physical infrastructure (Nelson, 2004) and fostering "software" in terms of more productive interactions across different actors (Levén et al., 2014). The emphasis on fostering institutions and facilitating linkages (Warwick, 2013) stands in contrast to the industrial policies implemented in Western Europe or the developmental states, aimed at upgrading the capabilities of specific "winners" (Amsden, 1989; Feldenkirchen, 1998).

2.1.3 Startup-centric innovation

The importance of startups in innovation and economic growth is often traced to Schumpeter's (1934) theory of entrepreneurship. The Schumpeterian entrepreneur drives innovation by triggering "creative destruction", which refers to a process "that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Schumpeter, 1942, p.83). Based on the idea of "creative destruction", the expectation is that fostering new entrants is essential for vibrant innovation systems, as entrepreneurs commercialise new ideas that disrupt the position, and existing technological paradigm, of incumbent firms (Acs et al., 2009; Block et al., 2013). Following Schumpeter, significant strands within economics literature have sought to advance entrepreneurship theory by examining the relationship between economic growth, entrepreneurship, and technological advances (Aghion and Howitt, 1992; Solow, 1956). For instance, research takes stock of how the supply of startup ecosystem institutions, such as venture capital, drive innovation activity (Lerner and Nanda, 2020).

Schumpeter-inspired startup-centric innovation policies focus on promoting the growth of innovative startups that drive disruption. An indicator of such disruptive aims is the objective of creating 'unicorn' firms within a timeframe, like Japan's J-Startup Initiative, launched in 2018 (Klingler-Vidra and Pacheco Pardo, 2022). Research showed that new entrants into the industry, which are typically small and young firms, are more likely to create disruptive innovation than incumbent firms (Abernathy and Clark, 1985). This is because incumbent firms tend to focus on incremental innovation that capitalise on their existing capabilities (Henderson and Clark, 1990). Entrepreneurial state policymakers, motivated by this kind of logic, target innovative startups as capable of driving technological upgrading, innovation, and economic growth (Autio et al., 2014).

Nascent startup-centric innovation policy typologies often employ a temporal logic, in terms of technological evolution or a firm's life cycle. Avnimelech and Teubal (2006) take an evolutionary approach in studying the Israeli venture capital industry, suggesting three phases of growth, beginning from background conditions to the pre-emergence phase and ending at the

emergence phase, with each phase characterised by different events and policy types. Breznitz (2007) asserts that an industry-policy feedback loop informs changes to innovation policies over time as policy performance changes industrial capabilities, which in turn shapes future policy needs. Audretsch et al.'s (2020) life-cycle approach details "innovative startup policies" according to four stages: the antecedents, to founding characteristics, to post-founding behavior, and finally, to the impacts and outputs. Starting with the antecedents, policies "target individuals who are likely to become involved in the creation of innovative new ventures" (Audretsch et al., 2020, p.6), while policies in the founding characteristics stage focus on the attributes of the startup.

The above research on industrial policy and NIS together with studies of startup-centric innovation have delineated key policy attributes (types of firms targeted, technologies specified, and instruments used), as summarised in Table 1.

Table 1. Summary of existing research's expectations of innovation policy attributes

	2.1 Western European and developmental state industrial policy	**2.2 National Innovation system**	**2.3 Startup-centric innovation**
Aim	Industry targeting and R&D support	Foster linkages among different actors	Creation of entrants who will develop transformative products and services
Type of firm(s) targeted by policy	Large industrial conglomerates	Multiple actors within the ecosystem, including incumbent firms, startups, research institutes, universities, and investors	Innovative startups
Nature of technology	Catch-up technological capabilities through to competing at the technological frontier	Competing at the technological frontier	Competing at the technological frontier
Technological sectors targeted	Heavy industries, ICT, semiconductors, biotech, telecommunications	ICT, software, pharmaceutical, biotech	ICT, software, artificial Intelligence, robotics, blockchain
Instruments	Credit lines, exchange rate manipulation, import controls, R&D	Equity-based capital markets, credit lines, research alliances, R&D subsidies, science parks,	Equity-based capital markets, credit lines, accelerators and incubators, R&D

	subsidies, tax incentives, science parks	tax incentives, technology transfer	subsidies, tax incentives, entrepreneurship visa, coaching, mentorship, and training

However, research has not yet clearly delineated what, precisely, is a "startup" and how these attributes are operationalised in policies. We further examine literature on innovative startups to develop expectations for such specifications.

2.1.4 Towards a systemic definition of startup-centric innovation policy

Our systematic literature review began by conducting a Web of Science search for a number of terms to describe the policy area, appearing in "all fields" of published academic articles. Details of our Web of Science search terms, the number of results, and the link for each search, are presented in the Appendix (Table A1). Our searches identified 171 articles, with 11 duplicates, resulting in a total of 160 distinct articles. We scanned each article for its definition of startups and startup policy. This revealed that 86 articles specified key attributes according to our four main categories: firm age, type of firm, target audience, and instruments used (refer to Table A2 in Appendix). This informed our analytical expectations for the four core attributes.

Research defining "startup" in terms of its age offers upper limits in years since founding. In their study on the survival rate of innovative startups, Colombelli et al. (2016) defined startups as young firms that are a maximum of five years old. Similarly, when studying the effect of university knowledge on the creation of innovative startups in Italy, Ghio et al. (2016) focused on firms that are under five years old. Other studies include Sauermann's (2018) work on employees' motivations, which operationalises startups as firms that are under six years old, and Grimpe et al.'s (2019) study on the management styles of high-tech startups where startups are defined as firms that are three years old or younger. Schneider and Veugelers (2010), meanwhile, conceive of a startup as being younger than six years old. Taking the range specified in these definitions, we put forth the following expectation:

> ***Expectation 1:*** *Startup-centric innovation policy targets firms according to age since founding as between three and six years old.*

To understand startup-centric innovation policy in the context of industrial policy that strives for technical capacity upgrading, we distinguish support for high-growth startups from entrepreneurship more generally. Acs et al. (2016) assert that entrepreneurship policies encourage individuals to start new business, regardless of the innovative nature. Román et al. (2013) conceptualise entrepreneurs as self-employed individuals who employ other workers, instead of restricting entrepreneurs to high-growth, or technology-focused, founders. In their study on innovative startup policies, Audretsch et al. (2020, p.1) emphasise that firms "introduce a new product, service, or process onto the market". Drawing these definitions together, innovative startup policies target one of the following three dimensions: commercialisation of an idea into a new product or service, growth orientation, or knowledge or technological intensity.

SMEs are conceived as a broader category—defined only by size—in which startups are a particular type, distinguished by their technological capabilities and/or growth potential. In this context, innovative startups look towards fast growth and global scale (Spigel, 2017). The broader category of SME-focused policies typically includes business support services (Doh and Kim, 2014) and building networks with other innovation system actors (Asheim and Coenen, 2005). Meanwhile, startup policies are purported to be primarily concerned with enabling technology-oriented innovation capacity. For instance, in their framework of innovative startups, Audretsch et al. (2020) detail founding characteristics as including high levels of human capital and a knowledge and technology base. Similarly, Colombelli et al. (2020) define innovative startups as firms that encapsulate one of three criteria: high level of R&D, high level of human capital, and intellectual property rights ownership. Drawing from Little's (1977) study on new technology-based firms, scholars use the term "high-tech startups" instead of innovative startups, making the connection between the firm type and its sectoral focus (technology) more explicit. For example, Bertoni et al. (2011) refer to high-tech startups as those operating in high-tech sectors in manufacturing and services, like telecommunications. In line with this literature that conceives of the relationship between SMEs and startups, we put forth our second expectation:

> ***Expectation 2:*** *Startup-centric innovation policy targets firms whose business models are based on frontier technology.*

Innovation systems research focuses on the interactions between different actors, such as firms, investors, and universities, that facilitate innovation (Lerner and Nanda, 2020; Lundvall, 1992). The Triple Helix (Etzkowitz, 2007) and open innovation (Chesbrough, 2003) concepts

refer to the beneficial interactions across innovation systems, including government actors, incumbent firms, startups, and universities. Entrepreneurial ecosystem conceptualisations are similar in the sense that they conceive of a range of actors that engage (Feld, 2012; Isenberg, 2010), with the point of departure being the conceptual focus on startup founders, explicitly aiming to create and scale innovative startups (Spigel and Harrison, 2018). An entrepreneurial ecosystem refers to "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam, 2015, p.1765). The ecosystems framework suggests that startups are embedded within an ecosystem and are dependent on other actors to grow (Stam and van de Ven, 2021). Scholars have highlighted the differences between the entrepreneurial ecosystem and others, such as clusters (Porter, 2000), industrial parks (Côté and Hall, 1995), and the wider NIS (Freeman, 1995); unlike clusters that focus on technical complementarities within a specific vertical industry, startup activities within the entrepreneurial ecosystem tend to involve horizontal engagement with technological innovation (Spigel, 2016).

Schemas delineate the range of actors included in the entrepreneurial ecosystem. For example, the World Economic Forum (2013) proposes that key actors in the ecosystem include customers, funders, and support services. In their taxonomy of entrepreneurial ecosystems, Brown and Mason (2017) suggest that key stakeholders within the ecosystem include (i) actors who are involved in venture creation, such as accelerators (ii) resource providers such as business angels, and (iii) connectors such as business brokers. Stam and van de Ven (2021) take a wider view by conceiving of entrepreneurial ecosystem actors as including consumers, investors, public institutions, research institutes, universities, and venture capitalists. In line with entrepreneurial ecosystem literature, we put forth our third expectation:

> ***Expectation 3:*** *Startup-centric innovation policy targets wider entrepreneurial ecosystem actors within innovation systems, such as accelerators, entrepreneurs, incubators, investors, and universities.*

Industrial and innovation policy areas both comprise a range of instruments, including education and training, import/export controls, provision of infrastructure, regulation, and the use of finance (access to finance, direct investment, and tax credits). Research on startup-centric innovation policies suggests that some similar instruments are employed; these include entrepreneurship education (Kuratko, 2005), venture capital market development (Hottenrott and

Richstein, 2020; Klingler-Vidra, 2018; Zhao and Ziedonis, 2020), and publicly backed accelerators and incubators (Brown and Mason, 2017). Lerner (2009) suggests that government policies for the financing of innovative startups fall into two types: those that either increase the demand for, or supply of, venture capital. In their study on South Korea's state support for startups, Pacheco Pardo and Klingler-Vidra (2019) delineate eight types of instruments, including attracting talent and investment, education, fostering of clusters and networks, funding, provision of infrastructure, regulation, stock market access, and taxation.

Research on entrepreneurship has incorporated a type of capital perspective (Pret et al., 2016; Spigel, 2013). While physical capital is most tangible in its characteristics, economic capital can be "immediately and directly convertible into money" (Bourdieu, 1986, p.242), while other forms of capital essential to startup growth, such as human and social capital, are more intangible (Haber and Reichel, 2007). Kim et al. (2006) argue that entrepreneurship policies should focus on human capital instead of economic capital because education and managerial experience play a bigger role in encouraging entrepreneurship than income and wealth. Given awareness that social capital deficiencies can preclude would-be founders from establishing and growing their businesses (Devarakonda et al., 2022), startup-centric innovation policies have used bonding and bridging capital building efforts, such as role model campaigns and coaching, mentoring, and networking (Klingler-Vidra and Liu, 2020). Social-capital-motivated startup policies have been found to strive to deliver strategic "access benefits" to incumbent firms around access to ideas and talent (Klingler-Vidra and Pacheco Pardo, 2022). In line with existing literature that details a range of instruments used for startup-centric purposive actions, we put forth a fourth expectation:

> ***Expectation 4:*** *Instruments used in startup-centric innovation policy include economic capital (funding and tax incentives), human capital (education and training), social capital (coaching, mentoring, and networking programs as well as immigration tools) and physical capital (infrastructure).*

2.2 Data and methods

The aim of this study is to conceptualise the key attributes of startup-centric innovation policy. To operationalise the abstract idea of startup-centric innovation policy into more concrete and observable indicators, we first developed analytical expectations relating to the age of the firm, nature of technology, actors targeted, and instruments used.

The analytical expectations were developed in two steps. First, we identified core attributes of startup-centric innovation policy by drawing together insights from industrial policy and innovation policy literature. Our study situates startup-centric innovation policy within the broader innovation and industrial policy types, as delineated across political economy and innovation studies scholarship (Kennedy, 2016; Kim, 2019). We contend that startup-centric innovation policy is a contemporary means of industrial policy, one focused on driving economic competitiveness, employment, and even national security through technological prowess, much like the aims of that of the developmental state. Startups, in an "open innovation" (Chesbrough, 2003) lens, are supported as part of ecosystems in which incumbent firms and new entrants benefit from increased interaction with one another. Different from the bank-based and large firm-focused developmental state, however, we theorise startup-centric innovation policy as emanating in an institutional context comprised by equity financiers and fluid labour markets. By making these connections we strive to bring startup-centric innovation policy into the analytical lens of the entrepreneurial state, developmental state, and industrial policy research across political economy scholarship. Based on our theoretical literature review on industrial policy and innovation policy in Section 2, we identified four main attributes of startup-centric innovation policy: firm age, type of firm, target audience, and instruments used.

Second, we theorised the four core attributes and developed the four main analytical expectations by conducting a literature review of existing research on startup-centric innovation policy. The search was carried out on Web of Science by searching for a number of key terms such as (1) "entrepreneurship policy" and "startup", (2) "innovation policy" and "startup", and (3) "startup" and "public policy". A full list of the search terms can be found in the Appendix under Table A1. The literature review first identified 171 articles and found that 11 articles were duplicates. From the remaining 160 articles, 86 articles were related to the four main categories that the researchers theorised based on insights from industrial policy and innovation policy literature. A review of these 86 articles was done to formulate the four respective analytical expectations of startup-centric innovation policy.

2.2.1 Data

Once we established expectations based upon our systematic literature review, we empirically tested the occurrence of these attributes across a global database of startup innovation policies. We used the GEN Atlas database, which comprises descriptions and structured data for 298 public sector policies and programs globally, across 192 countries from seven regions (Africa, Asia,

Europe, Middle East, North America, South America, and Oceania) between 1982 to 2021. The GEN Atlas database serves as a "tool for policymakers, advisors, and opinion leaders to learn about previously implemented policy models, articulated entrepreneurship strategies, and/or designs of public-sector-supported programs" (see https://www.genglobal.org/atlas). Given the geographic range and startup-focus, this dataset is uniquely suitable for testing our four analytical expectations for the core attributes.

The GEN Atlas database is originally created by the Global Entrepreneurship Network in November 2016 under the name "Startup Nations Atlas of Policies". The GEN Atlas database is a "compendium of public sector policies and programs that serves as a tool for policymakers, advisors and opinion leaders to learn about previously implemented policy models, articulated entrepreneurship strategies and/or designs of public-sector-supported programs" (Global Entrepreneurship Network, 2023). According to Global Entrepreneurship Network (2023), policy information on the database is contributed by a range of actors such as "policy experts, government officials, public sector program leaders, and members of the Startup Nations policy network". Contributors typically contact the GEN Policy team to submit their contributions for curation before they are posted on the database webpage. The policy instruments are also updated periodically with new details when more information is obtained. An example of such a policy can be found in the Appendix under Figure A1.

While the policy documents found in the GEN Atlas dataset may not have the same level of detail across the 298 policies, the types of information present in the policy database are consistent. A typical policy found in the database will have information on four key categories: 1) target of instrument, 2) type of support, 3) level of intervention, and 4) barriers addressed. GEN Atlas have further categorised the four key categories into sub-categories. The level of detail in each of the four key indicators can be found in the Appendix under Table A3. For the purpose of conceptualising startup-centric innovation policy in this research, the level of detail found across all the policies in the GEN Atlas database is adequate and sufficient to conduct the analysis. Information found under the four key categories are suitable to test for the four expectations that the study developed based on the literature review. Moreover, the policy information found in the GEN Atlas database are moderated by a member of the GEN Policy team before being updated into the database, ensuring some form of quality control and consistency over the policy information.

The GEN Atlas database of startup policies have been used by recent research on innovative startups. In their paper published in *Research* Policy, Audretsch et al. (2020) made use

of the GEN Atlas policy dataset to review existing startup policies around the world. Klingler-Vidra and Chalmers (2023) used the GEN Atlas policy dataset to identify innovation policymaking agencies for their research regarding the effects of the "entrepreneurial university" on innovation policymakers. In their research on the benefits of startup policies for incumbent firms, Klingler-Vidra and Pacheco Pardo (2022) similarly made use of the GEN Atlas policy dataset to identify startup policies in Japan.

Moreover, while the database covers 298 policies from 192 countries, the study notes that each country may have more startup-centric innovation policies that are not covered in the database. However, considering the timeframe of this 3-year PhD project, the GEN Atlas database serves as a quick and convenient database that offers a comprehensive set of innovation policies globally. For future research, other studies can complement the GEN Atlas database with other data sources such as the Organisation for Economic Co-operation and Development (OECD) Reviews of Innovation Policy and the OECD Science, Technology, and Innovation (STI) policy database known as STIP Compass.

2.2.2 Method

As a first step, we web-scraped and cleaned all data for each of the 298 policies. We extracted text-data offering qualitative descriptions about the nature, context, and structure of the policy. To analyse these text data and help test the first expectation, we located and extracted all text relating specifically to each policy's eligibility criteria as it pertains to firm age. This was accomplished using a simple string detection procedure in *Excel* whereby strings related to 'year*' were in our text data. All results were reviewed and cleaned, eliminating false positive hits (e.g., years since a policy was implemented). Expectation 1 was then empirically tested using the data obtained through this string detection approach.

Expectations 2, 3, and 4 were tested using textual analysis on the text data from the 298 policies. Textual analysis otherwise known as natural language processing is a type of quantitative analysis which focuses on "computationally extracting meaning from a collection of text" (Loughran and McDonald, 2016). Textual analysis has been increasingly used to conduct research in the field of innovation studies (Antons et al. 2020). Up till 2020, there has been 124 innovation-related articles published using text-mining approaches in the top 10 innovation management journals and top eight management journals (Antons et al., 2020). For example, Kergroach (2019) employed a text-as-data approach to compare the design of innovation policy mix aimed at technological upgrading versus those targeted at encouraging participation in Global Value Chain

(GVC) by analysing a dataset of national innovation policy documents from across 54 countries. Most recently, in their study regarding the effects of the entrepreneurial university on innovation policy-making, Klingler-Vidra and Chalmers (2023, p1) used a text-as-data approach to "examine the extent to which innovation policy leaders speak about startup-centric innovation" by comparing media coverage between entrepreneurial university alumni and non-alumni. Likewise, Saura et al. (2023) used textual analysis on a dataset of over 580,000 tweets to identify the limitations of open innovation.

The text-as-data approach offers important contributions to the field of innovation studies considering its strengths. First, the text-as-data approach allows "the powerful possibility of quickly scanning through long documents, or series of documents, and providing synthetic indicators that facilitate the identification of the topics covered in the text" (Ballandonne and Cersosimo, 2023, p.32). In light of the research aims to conceptualise startup-centric innovation policy, using the text-as-data approach on a dataset of global innovation policies allows us to effectively distil key themes and features of startup-centric innovation policy based on our four theoretical expectations. Second, the text-as-data approach offers easy implementation and interpretation (Humphreys and Wang, 2018). We test our expectations by using basic conditional word counts and identifying in terms of its frequency in the policy documents (Bae et al., 2023). Third, the text-as-data approach offers high transparency and increases replicability. This is in contrast to hand-coding the dataset which can include biases of the researcher and high costs for replication.

However, there are some disadvantages to the text-as-data approach. First, the method typically disregards the order of words in the dataset and typically sees words as independently occurring units (Loughran and McDonald, 2016). Despite this limitation, this automated method is superior to hand-coded analyses of the innovation policies dataset as it is less labour intensive when it comes to analysing huge amount of text material (Kobayashi et al., 2018). Second, the text-as-data approach is highly dependent on specific language features and the method has been developed over the years with a focus on the English language (Loughran and McDonald, 2016). For example, it would be difficult to use existing mainstream text-as-data techniques on documents in the Chinese and Japanese language as these languages lack inter-word spacing. Considering this, this study makes use of the GEN Atlas global database, which details in English, innovation policies around the world. Third, the method relies on the use of a word dictionary to conduct the analysis. Existing word dictionaries may not be directly relevant to the testing of hypotheses in this study. To overcome this challenge, this study creates our own domain-specific

dictionaries. Following Gentzkow et al. (2019), we developed bespoke dictionaries by hand-coding state-of-the-art research on startup centric innovation policy (Audretsch et al., 2020; Autio et al., 2014) to identify n-grams. We created three n-gram dictionaries to analyse text data relating to the technological nature of startup activities (expectation 2), the actors targeted (expectation 3), and the instruments used (expectation 4). N-grams are sets of terms and can be unigrams (single-word terms), bigrams (two-word terms), trigrams (three-word terms), and so on. Current research argues that text dictionaries that are "domain-specific" bespoke dictionaries (i.e., those developed for a specific context) tend to perform better than "off the shelf" dictionaries (Grimmer and Stewart, 2013, p.268).

For the first n-gram dictionary, we identified terms used to describe the technological nature in startup activities. These included basic science, blue sky, breakthrough, copyright, discovery, exploitation, exploration, hi-tech, intellectual property right, invention, IP right, knowledge, legal protection, license, novel, patent, rights, science, scientific, technical, and technology. Our second n-gram dictionary captures terms on the actors targeted in the ecosystem which startups operate, in terms of actor types and activities. These include accelerator, angel, association, business angel, co-working, coach, corporate, entrepreneurship, fund, government agency, incubator, incumbent, industrial park, industry actor, investment bank, investor, large firm, mentor, MNC, multi-national compan*, multi-national enterprise, multi-national firm, multinational compan*, multinational enterprise, multinational firm, network, policymaker, R&D center, researcher, role model, science park, scientist, serial entrepreneur, small and medium sized, small and medium-sized, SME, spin-off, tech park, technology park, tech transfer, technology transfer office, trade, university, venture builder, and venture capital.

Our third set of n-grams capture language used to depict the instruments used in start-up centric innovation policy in type of capital terms[5]: (1) economic capital, which includes angel, debt, equity, finance, funding, grant, guarantee, invest, loan, rebate, seed, social security, subsidy, tax incent*, tax reduction, tax relief, venture capital, and working capital; (2) social capital, which includes advice, alliance, business angel, campaign, coach competition, connect, contact, event, guidance, link, meetup, mentor, network, role model, and ties; (3) human capital, which includes

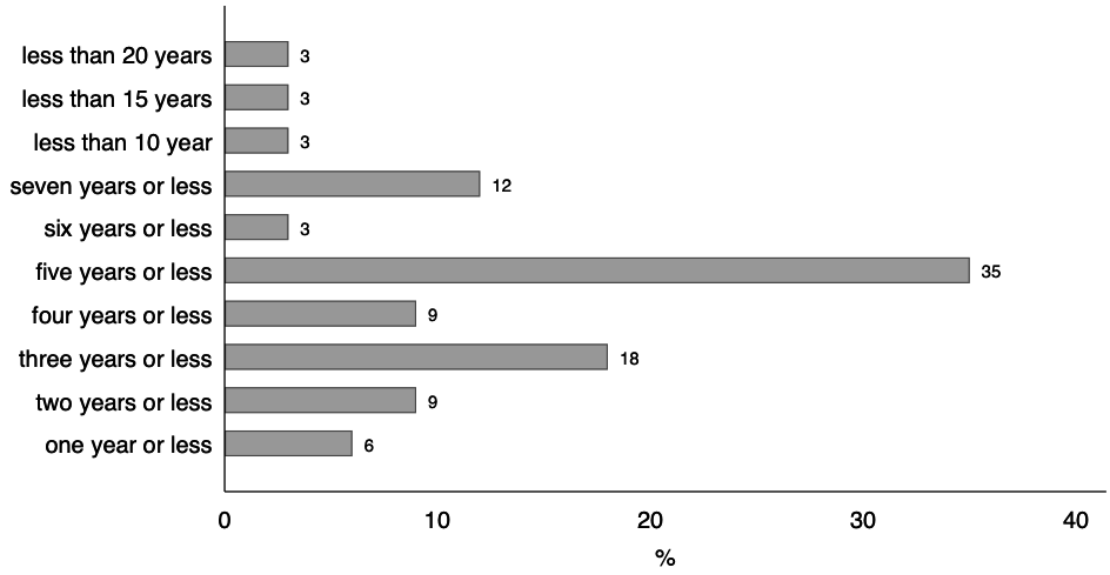
[5] Accelerator and incubator are coded under different types of capital because of their different nature. Accelerator is coded under human capital as we draw from Cohen et al.'s, (2019, p.1781) definition where the core features of accelerator are "fixed-term, cohort-based educational and mentorship programs". Incubator is coded under physical capital as we draw from Phan et al.'s (2005, p.165) definition: "Property-based organisations with identifiable administrative centers focused on the mission of business acceleration through knowledge agglomeration and resource sharing".

accelerator, business plan, competition, curriculum, education, entrepreneurship education, experience, intern, prize, skill, and train; and (4) physical capital, which includes center, co-working, incubator, infrastructure, lab, and office space.

2.3 Analysis and results

Testing for age/newness, which is crucial to our first expectation, we analysed policies' eligibility criteria as they pertain to firm age. Our first expectation is that startup-centric innovation policy tends to target recently established firms between the ages of three and five years old. An analysis of text data in our dataset confirms this expectation. Many of the policies targeting startups have specific eligibility criteria—in particular, the company's age since founding. Of the policies that target startups, 34 policies (11%) specify company age criteria. Figure 1 plots the proportion of policies referencing different company age eligibility criteria.

Figure 1. Percentage of policies using firm-age criteria

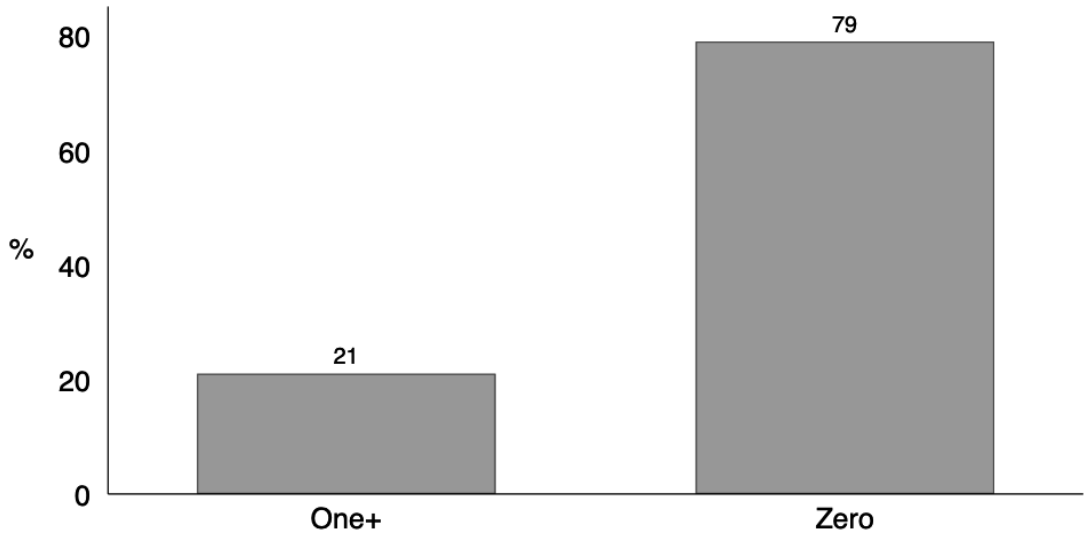


The findings presented in Figure 1 indicate a clear tendency to target firm-age criteria around five years or less. 77% of policies that define a startup in terms of age, specify the upper limit as less than five years old.

Expectation 2 predicts a relationship between startup-centric innovation policy and the technological nature of startup activities, which speaks to literature on policies targeting

upgrading, catching up, and the move towards the world technological frontier. For this analysis, we examine frontier technologies targeted by startup-centric innovation policy using our first n-gram dictionary. We identified the use of n-grams for each policy. The results presented in Figure 2 show the percentage of policies that either do not use any of these n-grams (Zero) or use one or more of these n-grams (One+). We see that 79% of policies use at least one of these n-grams, while 21% do not use any of these n-grams.

Figure 2. Percentage of policies using "Technological Nature" n-grams



A closer look at specific n-grams related to frontier technology is revealing. The word cloud, in Figure 3, visualises these results. The most frequently used "technological nature" n-grams by some margin is 'development', constituting 28% of our results. An example is the "Startup Peru" policy which co-finances young Peruvian firms in the "acquisition and development of specialised software designed for the commercial launch of the business."[6] This is followed by 'technology' (17%), 'research' (14%), 'knowledge' (8%), and 'science' (7%). By contrast, several n-grams were never used (0%); these included "blue sky", "exploitation", and "legal protection".

[6] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).

Figure 3. Word Cloud illustrating results for 'Technological Nature' n-grams.

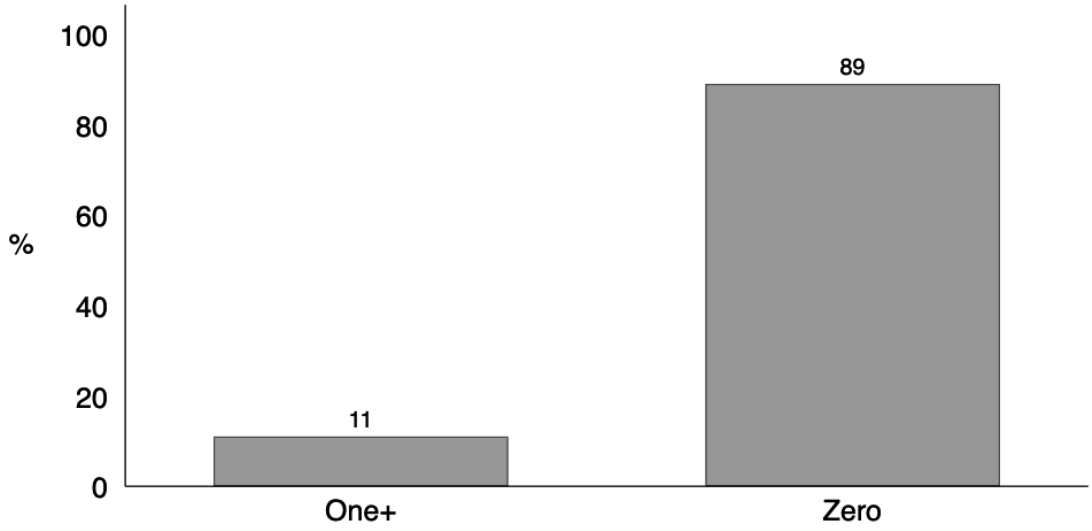
**Note: all n-grams that do not appear at least once in our dataset are omitted from the word clouds. Most frequently used words are larger and presented closer to the centre of the word cloud.

This finding for expectation 2 supports evidence from elsewhere that startup-centric innovation policy focuses on technology-oriented activities, but not necessarily at the technological frontier. However, while there are more policies mentioning these n-grams than not, there are still a large percentage (21%) of policies that do not appear to use the language of technologies. This suggests that state support of startup-centric innovation is broader than boosting capacity at the technological frontier, or in upgrading technological capacity, as in the developmental state context. Startup-centric innovation policy, in this sense, encourages technological activity more so than strict technological upgrading.

Our third expectation pertains to the ecosystem actors targeted, which we test by measuring the use of our n-grams dictionary describing the wider entrepreneurial ecosystem actors. We counted the use of each n-gram for each policy in our database. The results presented in Figure 4 show the percentage of policies that either do not use any of these n-grams (Zero) or use one or more of these n-grams (One+). We see that there is an overwhelming majority (89%)

of policies using one or more of these entrepreneurial ecosystem n-grams. Only about 11% of policies in our dataset do not use any entrepreneurial ecosystem n-grams at all.

Figure 4. Percentage of policies using 'Policy Targets' n-grams



Results are visualised using a word cloud (Figure 5). Here, the most frequently used Policy Target n-grams include 'SME' (12%), 'investor' (11%), 'policymaker' (9%), 'mentor' (7%), 'accelerator' (7%), and 'angel' (7%). For example, "InovAtiva Brazil" is an acceleration program implemented in 2012 by Brazil's government which, amongst other things, specifies that it helps startups improve "connection to angel investors, investment groups, and large companies seeking to engage in open innovation activities."[7] Surprisingly, n-grams that were not at all located in our database (0%) include 'industrial park', 'MNC', 'tech park', and 'venture builder. The absence of "industrial park" supports evidence that startup-centric innovation policy differs from previous industrial policy where it shifts away from a focus on supporting firms in specific industries to one that is centred around innovative startups more broadly across different technological sectors. We instead see the use of n-grams such as "science park", "techno park", "technology park", and "technological park".

[7] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).

Figure 5. Word Cloud illustrating results for 'Policy Target' n-grams

**Note: all n-grams that do not appear at least once in our dataset are omitted from the word clouds. Most frequently used words are larger and presented closer to the centre of the word cloud.

Finally, our fourth expectation is that different types of capital are either provided, or named as areas to boost, in startup-centric innovation policy. We tested for specific terms that correspond to the types of capital (Becker, 1993; Bourdieu, 1986): economic, social, human, and physical. Our results are presented in Figure 6. We see that across all policies in our dataset, economic capital is most used, with 29.9% of policies including at least one economic capital n-gram, highlighting the importance of economic capital in relation to the other types of capital for startup growth. The second highest is human capital (26.6%), followed by social capital (24.8%) and physical capital (18.6%).

Figure 6. Percentage of policies using different capital instruments

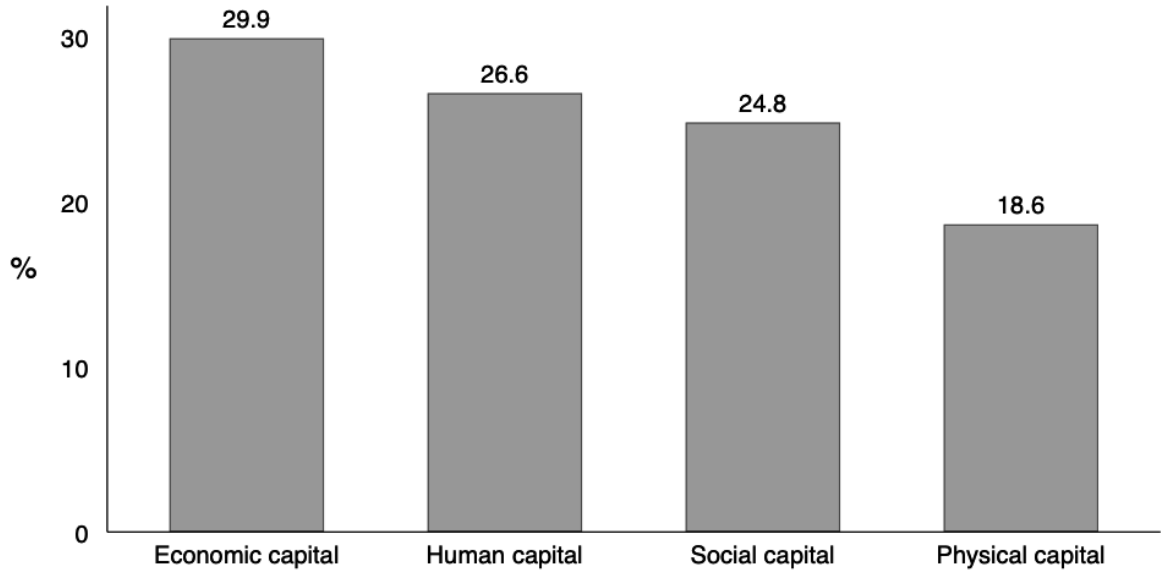
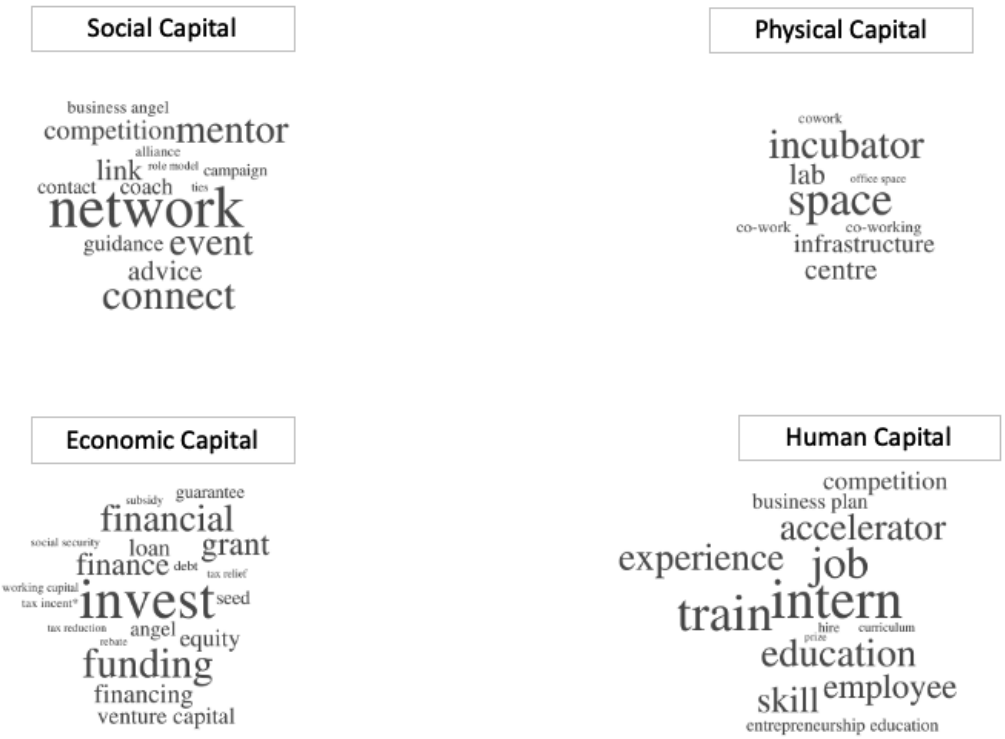


Figure 7 visualises the n-grams which are used most for each of the four types of capital. Looking first at social capital, we see several prominent n-grams, including 'network' (19%), 'connect' (13%), 'mentor' (12%), and 'event' (11%). An example is the "Innovation Norway" policy created in 2004 by Norway to "help companies to build networks with investors and consult various forums where investors are looking for potential investments."[8] Next, for economic capital, the most frequently used n-grams include 'invest' (19%), 'funding' (13%), 'financial' (11%), and 'grant' (9%). For example, "The Cyberport Creative Micro Fund" policy implemented by Hong Kong in 2010, "offers a grant of HK$100,000 (around €11,600) to high potential digital tech startup projects."[9] Though tax incentives are often covered in academic research on venture promotion (e.g., Lerner, 2009), n-grams associated with 'subsidy' (<1%), 'tax reduction' (<1%), and 'tax relief' (<1%) appear only very infrequently in our dataset. For human capital, the results are more evenly attributable to several key n-grams, including 'intern' (14%), 'train' (13%), 'job (11%), 'education'' (9%), 'experience' (9%), and 'accelerator' (9%). An example is the "Dutch Centre for Entrepreneurship – DutchCE" policy introduced in 2015 by The Netherlands. The DutchCE policy text explains that it is "created to allow university resource centers to pool capacity to promote joint research and knowledge sharing on entrepreneurship education, at low

[8] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).
[9] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).

operational costs."[10] Finally, physical capital has less frequently used n-grams and the results are largely driven by one n-grams, namely 'space (24%). 'incubator' (20%), 'centre' (and 'center') (13%), and 'lab' (13%) are also prominent n-grams. An example of a policy is "Startup India", which includes measures such as the "creation of incubators, tinkering labs, business technology parks."[11]

Figure 7. Word Cloud illustrating results for the different capital instruments



**Note: all n-grams that do not appear at least once in our dataset are omitted from the word clouds. Most frequently used words are larger and presented closer to the centre of the word cloud.

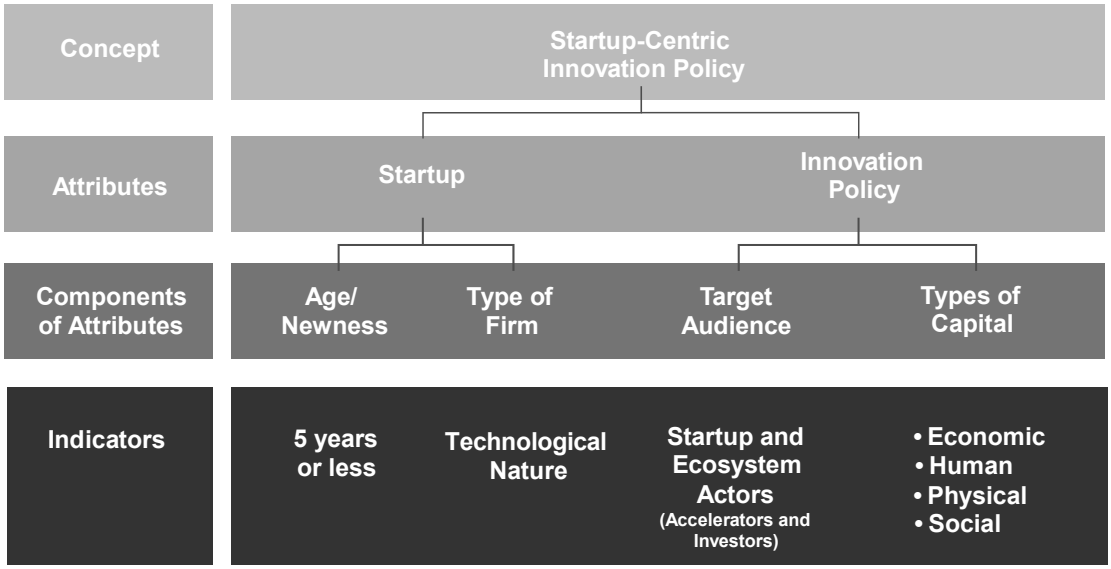
2.4 Discussion

We hand-coded startup-centric innovation policy attributes in 86 articles to inform expectations about the following attributes—the age of the firm, the nature of technology targeted, ecosystem actors included, and the instruments used. Our systematic coding of the literature and initial empirical test of startup-centric innovation policy offers further specificity for future researchers

[10] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).
[11] Source: https://www.genglobal.org/atlas/cordoba-scales (accessed 12.11.2022).

studying this growing policy area. As a type of industrial policy, startup-centric innovation policy differs from earlier forms of industrial policy with respect to several key attributes. In Figure 8, we visualise the key attributes of startup policy.

Figure 8. Concept formation of startup-centric innovation policy



The first attribute is age. We find that 77% of the startup-centric innovation policies define startup firms as being five years old or less. Different from earlier industrial policy and national innovation system policy, startup-centric innovation policy places an explicit emphasis on the age of the target firm in its eligibility criteria. This finding is consistent with literature suggesting that new firms are valuable sources of innovation (Czarnitzki and Delanote, 2013; Vaona and Pianta, 2008) and job creation (Hyytinen and Maliranta, 2013; Klingler-Vidra and Pacheco Pardo, 2020), and that targeted policy initiatives are needed to support these new innovative firms (Schneider and Veugelers, 2010).

Second, we distil the language used to depict the technological nature. Collectively, 79% of all policies describe the target beneficiaries' technologies with generic language, such as "development`", "technology", and "knowledge". The language used to describe the startups' technological nature is not necessarily focused on the technological frontier nor is it specifically invoking disruptive innovation. In this sense, startup-centric innovation policies are not boosting

capacity to compete at the world's technological frontier, as in the East Asian developmental state. Rather, the implicit expectation seems to be that startups bring about disruption based on their business model and their application of technology, rather than the development of deep or blue-sky technologies. Moreover, studies have shown that high-tech firms constitute only a segment of high-growth firms (Mason and Brown, 2013). Instead, high-growth firms are found to be innovative regardless of their industry (Segarra and Teruel, 2014). Such high-growth firms may not necessarily produce "disruptive innovation", but instead may simply be modifying or differently applying existing technologies (Colombelli et al., 2014). This may explain why about one-fifth of the policy interventions in the dataset did not restrict its focus to specific technologies or invention-centric activities.

The third attribute is the wider target actors. Consistent with the literature on entrepreneurial ecosystems (Stam, 2015), we find that startup-centric innovation policy targets ecosystem actors other than the startup, such as accelerators, incubators, large firms, and universities. The finding is consistent with the entrepreneurial ecosystems literature, which suggests that different actors and factors within a geographically area interact to enable productive entrepreneurship (Johnson et al., 2022). It is insufficient for policies to only target startups to promote startup-centric innovation. Actors such as large firms can help attract skilled human capital to act as entrepreneurial employees for startups (Harrison et al., 2004), whereas universities act as a source of knowledge for startups to carry out innovative activities (Etzkowitz, 2007). This suggests that in the policy context, startups are conceived as benefiting from their position within a wider entrepreneurial ecosystem where external actors and firms offer resources that can boost their performance. Again, startup-centric innovation policy is a form of NIS, rather than strict commercialisation or invention-focused policy.

The fourth attribute is concerned with the type of capital targeted, being either economic, human, social, or physical. Ranking the highest, 29.9% of policies use the language of economic capital, with "invest" and "funding" being the most used n-grams. While most policies focus on economic capital, many policies also emphasise non-financial resources, with 26.6% and 24.8% of policies using the language of human and social capital respectively. This finding is consistent with literature emphasising the role of human and social capital on the performance of innovative startups (Batjargal, 2007; Klingler-Vidra et al., 2021). Research showed that relational support is crucial to the growth of high-growth firms; the growth of innovative startups depends not only on the availability of finance, but also on other factors that boost human and social capital endowments, such as education (Brüderl et al., 1992), social networks (Batjargal and Liu, 2004),

and the presence of mentors and role models (Klingler-Vidra and Liu, 2020). Different from previous industrial policy that focused on industry targeting and R&D support, startup-centric innovation policy, as a form of NIS, emphasises fostering linkages among different actors. In this regard, it is not surprising that the instruments used often correspond to the language of social capital (24.8%) Moreover, studies have shown that the presence of social capital can help startups acquire economic capital (Jonsson and Lindbergh, 2013). For instance, startups can gain access to funding resources via acquiring financial information from their networks.

Our analysis specifies what startup-centric innovation policy is and seeks to provide clarity for scholars seeking to study the role of government policy in promoting high-growth entrepreneurship-led economic development. With the heterogeneity of policy initiatives implemented to promote startup growth, our ambition is for our paper to provide an advance in operationalising startup-centric innovation policy in terms of four main attributes. We also complement the "stage-based framework" of innovative startup policies developed by Audretsch et al. (2020). While we agree that startups go through different stages of development and that the support provided by public policies should vary accordingly, we believe that the "stage-based" perspective on startup policies offered by Audretsch et al., (2020) can be strengthened. First, our conceptualisation provides added clarity to what an innovative startup is under the term "startup policy" by specifying its characteristics in terms of age and technological nature. Second, we offer a starting point for scholars to compare and assess the similarities and differences of startup policy across the four different stages of development (antecedents, founding behaviour, characteristics, outcome) in terms of the target audience and the types of capital targeted.

2.5 Conclusions

A variety of efforts have been implemented, across the globe, to promote startup-centric innovation. Despite the ubiquity of startup-centric innovation policies and the "entrepreneurial state", in the 21st century, the absence of a clear definition of this policy type creates gaps in knowledge of the range of policies employed and their performance. This paper addresses this issue by specifying the attributes of startup-centric innovation policy as delineated in state-of-the-art literature, and then testing the appearance of these attributes in a global startup-centric innovation policy database. Specifically, we tested the occurrence of four attributes in the text descriptions and structured categories of the GEN Atlas database of 298 public sector policies from 192 countries.

With our conceptualisation of startup-centric innovation policy, we strive to contribute to the analytical clarity around the startup-centric innovation policy area. We also offer a methodological advance by using text-as-data techniques, which enable a more precise understanding of what constitutes startup-centric innovation policy. Finally, we hope these advancing in "knowing startup-centric innovation policy when you see it" can offer actionable insights for policymakers seeking to promote the growth of local startups. To our knowledge, this study is one of the first few attempts to use text-as-data methods to study startup-centric innovation policies globally (exceptions being Prufer and Prufer, 2020 and Klingler-Vidra and Chalmers, 2022).

There are limitations to our approach. Although we conducted a systematic literature review, we acknowledge that our engagement with 86 articles is not exhaustive. The GEN Atlas dataset is one of the most robust, and is used in other studies (e.g., Audretsch et al., 2020). However, it is limited in its geographic coverage and the consistency with which startup policy information is detailed. This results from the way the dataset is constructed, with local partners of GEN Atlas including their own descriptors.

Future research can address these points by extending the systematic literature review across time, languages, and more articles. As the GEN Atlas dataset is revamped, the quality of data for these types of tests will improve. Additionally, future research can see the building out of novel databases of startup policies, striving for further geographic coverage and structured policy detailing. Further studies can also add to the analytical understanding of startup policies. For instance, they can investigate whether the key attributes vary across countries by using comparative frameworks such as Varieties of Capitalism (Hall and Soskice, 2001) and National Business Systems (Whitley, 1999). Different types of capitalism might align with the use of distinct attributes in terms of startup age, frontier technology, ecosystem actors, and types of capital supported. Research can also explore temporal shifts to determine the extent to which the grammar and instruments used have changed over time. Furthermore, policymakers have adopted a central role in developing entrepreneurial ecosystems in many contexts (Feldman and Lowe, 2018). Future studies can use our conceptualisation to examine the role of startup-centric innovation policy in shaping performance of entrepreneurial ecosystems. For example, scholars can study how particular attributes of startup-centric innovation policy stimulate changes in entrepreneurial ecosystem dynamics.

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Appendix

Table A1. Web of Science search summary

Search terms	Results	Link to search
"entrepreneurship policy" and "startup"	10	https://www.webofscience.com/wos/woscc/summary/eeabec59-3123-4231-8d4b-33e20c457054-3a17276e/times-cited-descending/1
"entrepreneurship policy" and "start-up"	19	https://www.webofscience.com/wos/woscc/summary/03e59e31-6d07-43e7-890c-dbb619fdf427-3a175057/times-cited-descending/1
"innovation policy" and "startup"	13	https://www.webofscience.com/wos/woscc/summary/52e1f45a-ebb4-4bde-90e0-fe29a1dce9ef-3a1746b0/times-cited-descending/1
"innovation policy" and "start-up"	12	https://www.webofscience.com/wos/woscc/summary/7f57f914-0098-4a8b-9d15-953bcdcfad58-3a174ce3/times-cited-descending/1
"start-up" and "public policy"	70	https://www.webofscience.com/wos/woscc/summary/0f479f63-bcab-4c02-8120-351dca37e3a0-3a176eb7/times-cited-descending/1
"startup" and "public policy"	17	https://www.webofscience.com/wos/woscc/summary/01685423-fef0-4793-a529-5bcd4b36fa64-3a177218/times-cited-descending/1
"entrepreneurial state"	29	https://www.webofscience.com/wos/woscc/summary/e7514e08-1ed2-4d28-bbb8-5e52aa159b73-3a176084/times-cited-descending/1
"entrepreneurial developmental state"	1	https://www.webofscience.com/wos/woscc/summary/7eb1e769-8f4a-4d24-b2d9-e20664fe6f51-3a175db2/times-cited-descending/1

Table A2. Articles included in the review

Dimensions of startup policy	Studies
Age of the firm	Biancalani et al. (2022), Kantis et al. (2020), Colombelli et al. (2020), Zhao & Ziedonis (2020), Giraudo et al. (2019), Doblinger et al. (2019), Lukes et al. (2019), Navarro (2018), Blume-Kohou (2016), Hottenrott et al. (2016), Kremel (2016), Grilli & Murtinu (2014), Filson & Oweis (2010)
Type of firm	Licht and Nerlinger (1998), Filson and Oweis (2010), Fritsch and Schroeter (2010), Goniadis and Varsakelis (2012), Colombo et al. (2016), Hottenrott et al. (2016), Ramaciotti et al. (2016), Zhou et al. (2016), Ablon and Golay (2017), Qian (2017), Fossen and Martin (2018), Fukugawa (2018), Hochberg et al. (2018), Turner (2018), Doblinger et al. (2019), Fudickar and Hottenrott (2019), Giraudo et al. (2019), Audretsch et al. (2020), Colombelli et al. (2020), Gray et al.

	(2020), Liu et al. (2020), Zhang et al. (2020), Zhao and Ziedonis (2020), Biancalani et al. (2022), Long et al. (2022)
Target audience	Lee (1996), Licht and Nerlinger (1998), Lemarie et al. (2001), Thierstein and Willhelm (2010), Bourelos et al. (2012), Dams et al. (2012), Grilli (2014), Kremel (2016), Xu (2016), Subrahmanya (2017), Davidson (2018), Fukugawa (2018), Turner (2018), Yeo (2018), Cohen et al. (2019), Doblinger et al. (2019), Fudickar and Hottenrott (2019), Hemmert et al. (2019), Lukes et al. (2019), O'Brien et al. (2019), Vedula and Fitza (2019), Gray et al. (2020), Harrison et al. (2020), Hong et al. (2020), Kantis et al. (2020), Sansone et al. (2020), Harima et al. (2021), Buckley and Mitra et al. (2022), Leite et al. (2022), Santo (2022)
Instruments used	Licht and Nerlinger (1998), Lemarie et al. (2001), Gilbert et al. (2004), Acs and Szerb (2007), Cumming (2007), Shane (2009), Linan et al. (2011), Bourelos et al. (2012), del-Palacio et al. (2012), Roman et al. (2013), Grilli (2014), Grilli and Murtinu (2014), Morris et al. (2015), Yusuf (2015), Blume-Kohou (2016), Edelman et al. (2016), Ramaciotti et al. (2016), Ablon and Golay (2017), Astebro (2017), Qian (2017), Uzuegbunam et al. (2017), Buckley and Davis (2018), Gordon and Sarada (2018), Henrekson and Sanandaji (2018), Navarro (2018), Benner (2019), Doblinger et al. (2019), Giraudo et al. (2019), Giudici and Agstner (2019), Hemmert et al. (2019), Kwapisz (2019), Sedlacek and Sterk (2019), Audretsch et al. (2020), Colombelli et al. (2020), Gray et al. (2020), Hottenrott and Richstein (2020), Kantis et al. (2020), Kato (2020), Lee et al. (2020), Liu et al. (2020), Maggor (2020), Zhao and Ziedonis (2020), Croteau et al. (2021), Dams et al. (2021), Karlson et al. (2021), Laplane (2021), Morisson and Mayer (2021), Villegas-Mateos (2021), Audretsch and Fiedler (2022), Biancalani et al. (2022), Dvoulety (2022), Lamberty and Nevers (2022), Mitra et al. (2022), Santo (2022), Shirokova et al. (2022)

Table A3. Summary of the four key indicators

1. Target of instrument	**2. Type of support**	**3. Level of intervention**	**4. Barriers addressed**
Existing SMEs	Direct financial support	Environmental	Access to capital
Larger, established companies	Indirect financial support	Firms	Access to markets
Scale-ups	Non-financial support	Individual entrepreneurs	Cultural/Mindset
Startup firms			Regulatory

			Skills/Talent
			Ecosystem engagement/coordination
			Other

Figure A1. Example of a policy (from Japan) in the GEN Atlas database

Japan Investment Corporation (JIC): A Public-Private Venture Fund

CONTEXT

Japan is the world's third largest economy. But, compared to the U.S. and China, the two largest, it lags far behind in the number of startups going public with an IPO and boasts only one billion-dollar startup ("unicorn"). The country trails many economies in overall venture-deal volume. In 2020, the Wall Street Journal reported that Tokyo-based SoftBank, a leading tech investor, showed little interest in funding homegrown startups.

In response, the government has sought to direct public money into business with high growth potential while stimulating private investment. To this end, it created a $18 billion government-backed investment fund in September 2018 - the Japan Investment Corp (JIC). The government holds a 95% stake in JIC.

JIC took over the role of the Innovation Network Corporation of Japan (INCJ), a state-backed fund set up to accelerate the growth of domestic companies. But, rather than investing directly in companies as INCJ did, JIC established funds with private equity firms, sovereign wealth funds and institutional investors to invest in companies.

SUPPORT MECHANISM

JIC establishes investment funds and supplies capital to business sectors that meet its policy objectives. The Ministry of Economy, Trade and Industry set a target of 20 new unicorns by 2023. By some estimates, Japanese venture investment volume needs to increase five or six fold to fit the relative size of its economy.

In 2020, for example, JIC created a $1.2 billion venture capital fund (JIC Capital Co., Ltd.) that invested nearly $100 million in an initial group of seven companies. See timeline section below for information on other JIC funds. Through these, JIC seeks to increase venture capital from private investors and the supply of private sector risk capital, and contribute to the development of investment professionals.

ELIGIBILITY

JIC makes investments in accordance with Japan's Industrial Competitiveness Enhancement Act. It has established funds with four target investment focus areas:

1. Society 5.0 businesses: Drives the creation of new businesses for Society 5.0, those where uncertain and discontinuous growth is required, and which demand a significant amount of investment capital over a long period of time.

2. Unicorn startups: Invests in potential unicorn startups, supports sustainable growth of companies with a competitive edge in the global economy.

3. Leveraging promising untapped regional technologies: Addresses the need for capital among regional startups such as university spin outs with under-utilized technology and high revenue potential.

4. Promoting business consolidation across industries and organizations: Supports industrial competitiveness through business consolidation aiming to open innovation in the sectors with potential international competitiveness.

TIMELINE

September 2018: JIC is created and launches the INCJ, Ltd. fund by splitting Innovation Network Corporation of Japan. INCJ, Ltd. begins investment activities to finance key industries that leverage open innovation across boundaries between companies and industries.

July 2020: JIC launches the Venture Growth Investments Co., Ltd. fund aimed at improving Japan's international competitiveness by promoting innovation that addresses social and industrial issues.

September 2020: JIC establishes the JIC Capital Co., Ltd. fund to finance new Society 5.0 industries, promote business consolidation, enhance international competitiveness and establish next-generation social infrastructure for promoting digital transformation.

January 2021: Japan's Parliament considers a new $20 billion fund to invest in environmental innovation during the next decade. Approval is expected.

CHALLENGES + LESSONS TO DATE

JIC was designed to address criticism of the failed Innovation Network Corporation of Japan, a government fund established in 2009. The INCJ was supposed to finance innovative businesses, but the $18 billion government-backed fund was mainly used to rescue existing struggling hardware companies.

JIC faced internal disputes among its Board members in 2018, which reflected conflicts inherent in public-private venture capital funds. For example, the Ministry of Economy, Trade & Industry (METI) retracted its policy of allowing JIC to aggressively invest in overseas investment vehicles, which were expected to produce high returns. JIC executives viewed the Ministry's moves as assuming control over its investment decisions, creating a public dispute over the government's role in the fund.

IMPLEMENTING AGENCIES

Japan Investment Corporation (JIC)

KEY ADVISOR(S) OR LEADER(S)

Hiroshige Seko, Minister of Economy, Trade & Industry

NOTES + ADDITIONAL CONTEXT

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CHAPTER THREE

GOVERNMENT POLICY AND THE DEVELOPMENT OF THE ENTREPRENEURIAL ECOSYSTEM: A COMPARATIVE CASE STUDY OF SINGAPORE AND HONG KONG

Abstract: In the last decade, the entrepreneurial ecosystem concept has attracted much attention. Despite the popularity of the concept, the role of the state in the emergence and evolution of entrepreneurial ecosystems remains under-explored. Studying the systemic role of government policy in two Asian entrepreneurial ecosystems (Singapore and Hong Kong), this study fills a gap in the literature while building on previous research about the top-down approach of ecosystem governance. Specifically, this article combines institutional theory and the concept of entrepreneurial ecosystem dynamics to understand how government policy can promote the development of entrepreneurial ecosystems. The paper finds that an "entrepreneurial ecosystem policy mix" with regulative, normative, cognitive, and conducive policy instruments helps to develop the entrepreneurial ecosystem by stimulating key ecosystem dynamics. At the same time, such a "policy mix" can be tailored according to the local context of the ecosystem. By providing deeper insights on the role of the state in the entrepreneurial ecosystem, this study offers important theoretical and policy contributions.

Keywords: Entrepreneurial ecosystem, Government, Innovative startup, Public policy

3. Introduction

Increasingly, scholars and policymakers have turned to the entrepreneurial ecosystem concept to understand why innovative entrepreneurship flourish in some regions and not in others (Alvedalen and Boschma, 2017; Isenberg, 2010, 2011; Stam, 2015). Innovative entrepreneurship taken as innovative startups in this paper, refer to new ventures which introduce technologies into the market and commercialise innovation, contributing to economic growth (Audretsch, 2002, 2004; Colombelli and Quataro, 2018). Responding to the calls of paying more attention to the broader context of entrepreneurship, the entrepreneurial ecosystem concept emerged as an approach to study entrepreneurship via a systemic perspective (Isenberg, 2010; Feld, 2012). The entrepreneurial ecosystem generally refers to "a set of interdependent actors and factors that are governed in such a way that they enable productive entrepreneurship" (Stam, 2015, p.1765). The type of entrepreneurship that is studied typically refers to "individuals exploring opportunities to discover and evaluate new goods and services and exploit them in order to add as much value as possible" (Stam and Spigel, 2017, p.1).

Works on the entrepreneurial ecosystem include studies on the different elements present in the ecosystem (Isenberg, 2011; Spigel, 2017), the entrepreneurial ecosystem dynamics (Acs et al., 2017; Audretsch and Belitski, 2017), the support mechanisms beneficial to start-ups (Audretsch et al., 2018; Edelman and Yli-Renko, 2010), the impact of institutions on entrepreneurial ecosystems (Alvedalen and Boschma, 2017; Autio et al., 2014) as well as the performance of entrepreneurial ecosystems (Kuratko et al., 2017; Sussan and Acs, 2017). Yet, more can be done to contribute to this body of literature as the entrepreneurial ecosystem concept remains under-theorised (Alvedalen and Boschma, 2017; Spigel and Harrison, 2018). In particular, how entrepreneurial ecosystems emerge and develop have not been sufficiently explored (Mason and Brown, 2014). Colombelli et al., (2019) and Mack and Mayer (2016) made important contributions by shedding light on the different stages of an entrepreneurial ecosystem's life cycle. However, while strong support from the government proves to be crucial for promoting entrepreneurial activity (Huggins and Williams, 2011; Parker, 2008), studies that understand the interactions between government policy and the entrepreneurial ecosystem's development trajectory are relatively limited (Spigel et al., 2020).

Moreover, despite the entrepreneurial ecosystem being made up of various interdependent actors, a large part of entrepreneurial ecosystem research has focused on the entrepreneurs as the main unit of analysis, resulting in limited knowledge on the role of other actors such as the government (Harper-Anderson, 2018). Research has shown that there are a variety of different

actors involved in the entrepreneurial ecosystem (Brown and Mason, 2017; Isenberg, 2014; Stam and Van de Ven, 2021). Existing studies on actors within the entrepreneurial ecosystem have focused on examples such as accelerators (Goswami et al., 2018; Harima, 2020), entrepreneurs (Harima et al., 2021; Thompson et al., 2018), incubators (Hernández-Chea et al., 2021; Theodoraki et al., 2020; van Rijnsoever, 2020), and universities (Hayter, 2016; Longva, 2021). Literature focusing on the entrepreneurs within the entrepreneurial ecosystem have suggested that startup founders contribute to the development of the local ecosystem by facilitating knowledge transfer (Harima et al., 2021) and creating shared meaning and resources through bottom-up social interactions (Thompson et al., 2018). On the other hand, research on support organisations such as accelerators, incubators and universities suggest that these organisations help to support the growth of the entrepreneurial ecosystem by overcoming weak network problems (Goswami et al., 2018; van Rijnsoever, 2020).

While research has also focused on the role of the government within the ecosystem, such research remains scarce (eg. Brown and Mawson, 2019; Wang et al., 2022). Specifically, studies on policy approaches remain weak on systematically examining policy frameworks as well as understanding how policy leads to the development of the entrepreneurial ecosystem. According to Spigel et al., (2020), "questions remain about the roles of government and policies" within the entrepreneurial ecosystem. Similarly, Stam and Van de Ven (2021) argue that more research is needed to "clearly define the role of the government" in the entrepreneurial ecosystem. This paper responds to these calls for more attention on the role of the state and government policy within the field of entrepreneurial ecosystem research (Stam and Van de Ven, 2021; Spigel et al., 2020). In this regard, the paper specifically focuses on the role of the state and government policy in the entrepreneurial ecosystem.

It is often suggested that entrepreneurs occupy a central position in the entrepreneurial ecosystem and their actions contribute to the sustainability of successful entrepreneurial ecosystems (Stam, 2015). A typical characteristic of the entrepreneurial ecosystem is thought to be its "relatively self-organised and self-sustaining nature" (Brown and Mawson, 2019, p.353), implying a less critical role for the state. Isenberg (2016) maintains that entrepreneurial ecosystems cannot be purposively "created" by policymakers. Instead, policy interventions can lead to adverse effects and disrupt the equilibrium of the entrepreneurial ecosystem (Colombo et al., 2019). However, examples of public policies which promoted the growth of entrepreneurial ecosystems successfully suggest that there is a place for government and public policy in the creation and development of the entrepreneurial ecosystem (Feldman and Lowe, 2018; Spigel et

al., 2020). Nascent work that studied the role of the state in the entrepreneurial ecosystem include the effects of government sponsorship (Motoyama and Knowlton, 2017), role of public and social services (Wei, 2022), and the role of public cluster policy (Lehmann and Menter, 2018).

Additionally, while the context is crucial in understanding entrepreneurial activities, the features of entrepreneurship and government intervention differ according to the varied contexts (Dubini, 1989; Van de Ven, 1993). In current entrepreneurship literature, most knowledge is conceptualised using the context of developed Western countries where the state's involvement in guiding the economy is often kept to minimal levels. In a study on entrepreneurial ecosystems research published in leading business and entrepreneurship journals from 2000 to 2017, Chen et al. (2020) found that out of 50 articles that examined the entrepreneurial ecosystems, only about 10% focused on Asian countries. More research needs to turn towards the East Asian economies where the state has adopted a prominent role in guiding and developing the economy with strong interventionist policies (Johnson, 1982; Wade 2004). Studying these Asian entrepreneurial ecosystems can also provide further empirical material for future works to establish a typology of entrepreneurial ecosystems and policies for the governance of the ecosystems (Spigel et al., 2020).

There remains a paucity in research about the features and the role of government policy in the development of the entrepreneurial ecosystem (Brown and Mawson, 2019). More studies are needed to explore the role of government in high-growth entrepreneurship based on the entrepreneurial ecosystem perspective, especially on investigating how government policy influences the development of the entrepreneurial ecosystem. Such knowledge not only provides further clarification of the roles that governments should adopt within the entrepreneurial ecosystem but also offers new insights to help explain the differences between different entrepreneurial ecosystems in terms of their features and their development trajectories (Spigel et al., 2020).

This study thus makes a step forward in understanding how entrepreneurial ecosystems emerge and evolve by studying how government policy affects the development of the entrepreneurial ecosystems in two East Asian economies: Singapore and Hong Kong. Drawing from the concept of entrepreneurial ecosystem dynamics (Brown and Mason, 2017) and institutional theory (Scott, 1995; 2001), this paper studies how government policies promote the development of entrepreneurial ecosystems by affecting the coordinative aspects of entrepreneurial ecosystems in terms of their underlying ecosystem dynamics.

The paper makes three important contributions. First, this article complements existing work by responding to the calls of scholars for an increased focus on studying the role of

government and public policy in the growth of the entrepreneurial ecosystem (Spigel et al, 2020; Stam, 2015). The study builds on existing knowledge of the role of that state in entrepreneurial ecosystems by extending theory on how institutions (Scott, 1995; 2001) affect the ecosystem dynamics (Brown and Mason, 2017). Second, it contributes to further empirical studies on the entrepreneurial ecosystems (Audretsch et al., 2018; Spigel, 2017) by studying two Asian cases and contribute to the rise of Asian entrepreneurial ecosystems phenomenon, which remains under-explored (Chen et al., 2020). Studying the two Asian cases also allow us to examine if existing research on entrepreneurship policies and entrepreneurial ecosystems put forth by scholars using cases predominantly from Western countries are similarly applicable to Asian cases (Acs et al., 2016). Geographically, the article also investigates city-states as the two cases, whereas existing comparative studies focus either on the city-level (Kapturkiewicz, 2021) or the regional-level (Belitski and Büyükbalci, 2021). Last, it provides practical guidance to policymakers on which types of policies to implement that best suit the needs of their local context when developing their own entrepreneurial ecosystems. This is especially important as governments globally increasingly embrace the entrepreneurial ecosystem framework (Stam, 2015) and turn to public policy as a tool to develop their respective entrepreneurial ecosystems (Feldman and Lowe, 2018).

To make this contribution, the paper is structured as follows. In Section 3.1, the theoretical framework is presented followed by the method in Section 3.2. The findings and the discussion are presented in Section 3.3 and 3.4 respectively. Section 3.5 concludes the paper.

3.1 Theoretical background

3.1.1 Entrepreneurial ecosystem framework

Several works have examined the entrepreneurial ecosystem and studied how it leads to the growth of high-growth entrepreneurship. Isenberg (2011) argues that there are six key components of a successful entrepreneurial ecosystem. They are markets, policy, human capital, finance, culture and supports. Spigel (2017, p.56) categorised the entrepreneurial ecosystem into three main areas: material attributes (policies, universities, infrastructure, open markets, support services), social attributes (networks, worker talent, mentors and role models, investment capital) and cultural attributes (supportive culture, histories of entrepreneurship). While entrepreneurial ecosystem frameworks relating to the components (Isenberg, 2010) or the attributes' relationships (Spigel, 2017) shed light on what constitutes a successful ecosystem, the entrepreneurial ecosystem concept remains tautological and provides little insight for government policy (Stam and van de Ven, 2021).

Through conceptualising four coordinative categories in the entrepreneurial ecosystem, Brown and Mason (2017) suggest that the entrepreneurial ecosystem should be studied by its four coordinative aspects: entrepreneurial actors, entrepreneurial providers, entrepreneurial connectors and entrepreneurial culture. These four aspects and their underlying entrepreneurial ecosystem dynamics influence an ecosystem's development from an embryonic ecosystem to a scale-up ecosystem (Brown and Mason, 2017). By studying the coordinative aspects and ecosystem dynamics as opposed to the mere presence or absence of ecosystem attributes, we can better trace and compare the development of different entrepreneurial ecosystems and understand the role government policies play in the development of these ecosystems. To capture the full complexity of entrepreneurial ecosystem development, this study thus uses Brown and Mason's (2017) concept of coordinative aspects and ecosystem dynamics to examine how government policy contributes to the development of the entrepreneurial ecosystem.

First, entrepreneurial actors are the core actors within the entrepreneurial ecosystem whereby they contribute to the growth of the ecosystem (Isenberg, 2010; Stam, 2015). Examples of entrepreneurial actors include founders and mentors for entrepreneurs (Mason and Brown, 2014). The significance of entrepreneurial actors in contributing to the growth of the ecosystem lies in two main processes: the interactions between entrepreneurs and the presence of "blockbuster entrepreneurship" (Brown and Mason, 2017). The interactions between entrepreneurs can help inspire and serve as a model for future entrepreneurs as well as directly mentor newer entrepreneurs for further growth (ibid). At the same time, "entrepreneurial recycling" can also occur where serial entrepreneurs act as business angels and reinvest in new entrepreneurs as well as transfer entrepreneurial learning to other entrepreneurs (Mason and Harrison, 2006). On the other hand, the presence of "blockbuster entrepreneurship" which refers to "young successful entrepreneurial firms that have grown exceptionally in size and wealth" (Napier and Hansen, 2011, p.3) provides immense spillover effects for the ecosystem's growth.

Second, entrepreneurial resource providers are actors that support the transfer of resources into growing startups (Brown and Mason, 2017). These resources are often crucial to startup growth and formation and examples include finance, infrastructure, and mentoring. There are two main groups of entrepreneurial resource providers: financial providers and accelerators. Financial providers help to transfer finance to growing firms and these providers range from traditional banks to business angels to venture capital firms. Accelerators on the other hand refers to programmes that help with the transfer of entrepreneurial support such as mentoring, networking, and working spaces. Increasingly, the public sector is regarded as a third group of resource

provider where the public sector responds to market failure and provides the resources that are lacking in the ecosystem (Mason and Brown, 2014).

Third, entrepreneurial connectors refer to individuals or organisations that help foster networks within the entrepreneurial ecosystem. These networks take the form of entrepreneur-entrepreneur, entrepreneur-investor, and entrepreneur-industry. These networks are critical for the growth of the entrepreneurial ecosystem as they help develop social capital and enable knowledge-sharing to take place (Brown and Mason, 2017). Examples of entrepreneurial connectors include business brokers, entrepreneurship clubs and professional associations. (Mason and Brown, 2014). A key entrepreneurial connector identified in the literature are individuals known as "dealmakers" (Kemeny et al., 2015; Napier and Hansen, 2011). These individuals have deep relationships within the ecosystem and can help to build relationships and foster new connections leading to new firm creation (Feldman and Zoller, 2012, p.24).

Lastly, entrepreneurial culture refers to societal norms and attitudes that are positive towards entrepreneurship (Isenberg, 2011; Brown and Mason, 2017). A positive entrepreneurial culture such as high social status of entrepreneurs and society's recognition of entrepreneurs' contributions can help to promote entrepreneurial aspirations (Isenberg, 2011). Additionally, places with a positive entrepreneurial culture attract ambitious entrepreneurs which can translate into more startups scaling up into large firms and higher level of initial public offerings (IPO) (Saxenian, 2006).

Works that used Brown and Mason's (2017) framework include studies on the interactions between different actors in Singapore's fintech ecosystem (Alaassar et al., 2022), the early evolution of the Santiago entrepreneurial ecosystem (Harima et al., 2021), and the role of urban policy in the development of Porto's cultural and creative industries (Loots et al., 2020). This study builds on existing research on ecosystem dynamics and extends entrepreneurial ecosystem research by combining the entrepreneurial ecosystem dynamics framework (Brown and Mason, 2017) with institutional theory.

3.1.2 Institutional theory

With the focus on studying the role of government policy on the entrepreneurial ecosystem dynamics, institutional theory makes a good analytical perspective as it offers a lens for us to identify instruments of government intervention and interpret how these instruments affect the entrepreneurial ecosystem. Institutional theory can also interpret how the entrepreneurial ecosystem coordinative aspects lead to entrepreneurship, as the theory theorises how actors within

the system will react. Combining the entrepreneurial ecosystem framework and institutional theory as the analytical lens also helps to extend the application of institutional theory within entrepreneurship research (Bruton et al., 2010). The entrepreneurial ecosystem provides an analytical frame instead of a theoretical one and it remains imperfect in interpreting while it is strong in structuring the analysis (Nelson and Nelson, 2002). The entrepreneurial ecosystem framework helps to structure the analysis in terms of the entrepreneurial process and sheds light on the obstacles faced by entrepreneurs, but it is less clear in identifying policies for policymakers to tackle these challenges. On the other hand, institutional theory studies the institutional environment: it is strong in interpreting how institutional interventions affect entrepreneurship but is not strong in structuring the analysis in terms of the entrepreneurial process and illustrating the obstacles faced in entrepreneurship (Siu et al., 2006; Williamson, 1990).

The literature identifies three main types of institutional pressures exerted by institutions on organisational actors: coercive, mimetic, and normative (DiMaggio and Powell, 1983). Coercive pressures arise from the legal environment and the prevailing standards, normative pressures emerge from professionalisation, and mimetic pressures arise from a high degree of uncertainty where actors mimic other actors who are perceived to be more successful or legitimate (Di Maggio and Powell, 1983). Based on these three types of institutional pressures, Scott (1995) suggested three pillars of institutional pressures: regulative, normative, and cultural-cognitive. According to Scott (1995, p.12), an institution is a resilient social structure that "gives organisational actors or individuals lines of action or orientations, but at the same time controls and constrains them". In essence, institutions are made up of "regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" (Scott, 2001, p.33). In this regard, regulative, normative, and cultural-cognitive influences exert coercive, normative and cultural-cognitive pressures on organisation actors, in turn guiding and constraining their behaviour (Bannister and Wilson, 2011; Mignerat and Rivard, 2009).

Based on institutional theory, policymakers constitute crucial and influential institutions that can affect the entrepreneurial process through implementing regulative, normative, and cultural-cognitive interventions. Additionally, institutional theory helps to unfold how the wider institutional context in the entrepreneurial ecosystem affects the behaviour of actors within the entrepreneurial ecosystem and explore how the coordinative aspects of entrepreneurial ecosystem are affected in relation to the actors. In the regulative pillar, coercive pressure explains how institutions restrict and influence the behaviour of organisational actors (Scott, 2001). The

regulative pressures arising from the establishment of rules, inspection of conformity and manipulating sanctions help to influence behaviour (Williamson, 1985). In the normative pillar, normative pressure provides an explanation of how the behaviour of organisational actors are constrained and shaped by social obligations (Scott, 2001). Examples of normative pressures are surveillance and sanctioning powers (Bannister and Wilson, 2011). In the cultural-cognitive pillar, mimetic pressure explains why organisational actors tend to imitate other actors in context of high uncertainty (Scott, 2001). These cultural-cognitive elements constitute shared conceptions of social reality and the frames through which meaning is made (Lizardo, 2010; Zeng et al., 2010).

While the crucial role of the three institutional pillars in economic growth has been generally agreed, studies regarding their effects on productive or destructive entrepreneurship remains unclear (Baumol 1990; Stenholm et al., 2013). For innovative entrepreneurship to flourish, additional institutions need to be considered (Anokhin and Schulze, 2009). To better understand the role of institutions on entrepreneurial activity, Stenholm et al. (2013) proposed a "fourth institutional pillar" known as the conducive dimension. The conducive institutional pillar refers to conditions crucial to innovation and knowledge-led growth such as access to suppliers and customers, "feeder" industries and institutions, higher education institutions, and skilled labour (Stenholm et al., 2013). Other conducive institutions include the presence of public and private R&D (Anokhin and Wincent, 2012), capacity for innovation and availability of scientist and engineers (Schillo et al., 2016). Works that have incorporated the conducive institutions when studying institutions include studies on the effects of national entrepreneurship ecosystem on individuals' entrepreneurial intentions (Schillo et al., 2016) and the relationship between the institutional environment and effects of startup's use of new technologies (Mohsen et al., 2021). Following Stenholm et al. (2013), the paper broadens the institutional dimension by adding the conducive dimension to better capture the role of government policies on the development of the entrepreneurial ecosystem.

Taken together, this article combines four different types of institutions (Scott's, 1995, 2001; Stenholm et al., 2013) with Brown and Mason's (2017) four coordinative aspects of the entrepreneurial ecosystem to study how government policies promoted the development of the entrepreneurial ecosystems in Singapore and Hong Kong respectively.

3.2 Method

The study relies on a qualitative research design employing a comparative case study method (Yin, 2003). Seeing that the entrepreneurial ecosystem constitutes a new phenomenon with

limited knowledge, the case study method is the most appropriate method (Eisenhardt, 1989). The case study method provides comprehensive and meaningful information which can help us to better understand complex social phenomenon (Yin, 2009) such as the development trajectories of entrepreneurial ecosystems. In contrast to large-N studies of entrepreneurial ecosystems, the case study method has an advantage where it allows us to understand more about the features and instances of how government policy helps to promote the growth of the entrepreneurial ecosystems (Blatter and Blume, 2008). This approach allows some degree of generalisation across cases, without reducing the chances for a context-based understanding. Additionally, the case study approach allows the use of multiple different sources of information through data triangulation, increasing the accuracy of the findings (Yin, 2003). To study the role of government policy on the development of the entrepreneurial ecosystem, this research uses Hong Kong and Singapore as case studies.

The emergence and rapid growth of entrepreneurial ecosystems, which have led to the rise in productive entrepreneurship and the growth of unicorn startups, have been studied in several recent works (Alaassar et al., 2022; Harima et al., 2021). However, these studies are mostly restricted to the individual level or meso level: studies on the macro level/policy level have been rare. Yet, entrepreneurial ecosystems are embedded within a wider institutional framework and they are affected by overarching government policies. Therefore, great attention must be paid to studying the role of the state in entrepreneurial ecosystems and how government policy affects ecosystem development. Focusing on the role of government policy, this study examines the different types of government policy and the policies' effects on the entrepreneurial ecosystem. There are several reasons for choosing Hong Kong and Singapore as the two case studies.

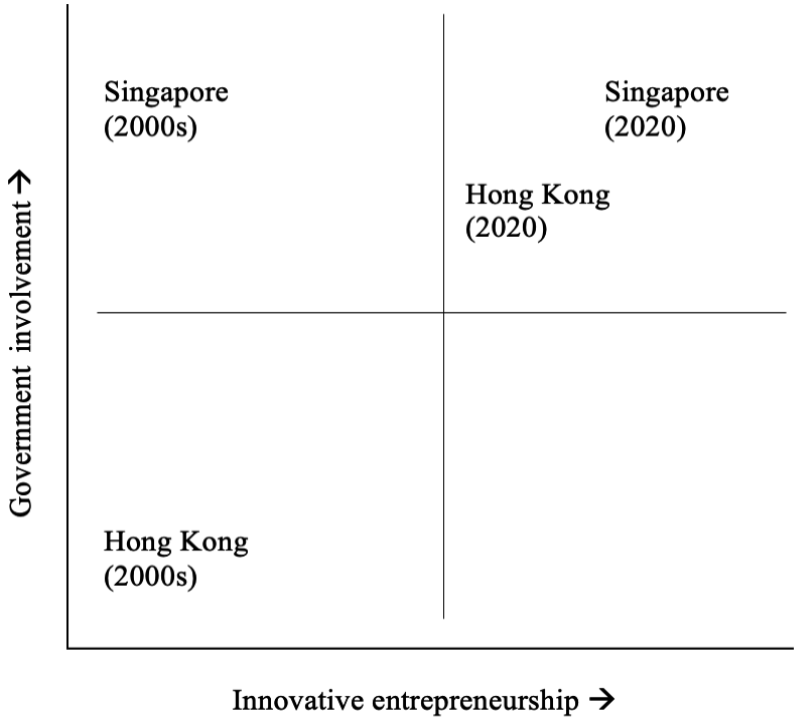
First, both Singapore and Hong Kong represent typical cases of the entrepreneurial state whereby the state plays a considerable role in orchestrating policies for economic development (Seawright and Gerring, 2008). The Singaporean government has been exemplar of the entrepreneurial state whereby economic development has been largely state-led since the 1960s (Audretsch and Fiedler, 2023; He, 2020; Yu, 1997) while Hong Kong's government has been increasingly more "hands-on" in driving economic development, displaying characteristics of the entrepreneurial state in the past two decades (Klingler-Vidra, 2018). Both Singapore and Hong Kong have seen a rise in government policies targeted at startups in the past two decades. For example, Singapore first implemented the Technopreneurship policy in 1999 and recently established the Startup SG (a platform to support the local startup ecosystem) in 2017. On the other hand, in Hong Kong, the government first formalised its intention to promote technological

entrepreneurship in a Legislative Council paper published in 2001 titled "Legislative Council Panel on Commerce and Industry Promoting Technological Entrepreneurship". In 2013, the Hong Kong government also launched StartmeupHK, an initiative to promote the local startup ecosystem. Second, both Singapore and Hong Kong offer wider implications beyond their individual context. Singapore is an example of a sovereign city-state while Hong Kong is a non-sovereign city-state. Both cases offer learning lessons for governments of other city-states or small states on how to develop their own entrepreneurial ecosystem. Examples of city-states or other small states with similar characteristics include Brunei, Kuwait, Malta, Monaco, and Qatar. This complements insights from existing research which tend to focus on the city-level, regional-level, or the country-level, which are not readily generalisable to city-states.

3.2.1 Case description

Singapore and Hong Kong are chosen as they both faced similar challenges of developing their entrepreneurial ecosystem for innovative entrepreneurship. As a paired case, the two cases represent diverse cases when studying the role of the government policy on the development of the entrepreneurial ecosystems. Both governments have approached it differently with different policies and with varying success over the years (Figure 1).

Figure 1. Relationship between government intervention and innovative entrepreneurship



Singapore is a city-state known for its heavy government intervention in various segments of the economy. Consistent with its history of extensive state intervention and use of industrial policy in the economy, the government is also actively involved in steering the development of its entrepreneurial ecosystem for innovative entrepreneurship (Wang, 2018). The Singaporean government has actively promoted R&D development, created industrial clusters, and provided funding assistance to local firms (Wang 2018; Wong et al., 2010).

While Hong Kong[12] is a city famous for laissez-faire capitalism with its unique features of positive non-interventionism (Fuller, 2010), state activism and government intervention is increasing, especially in the innovation and high-tech startup sector. As detailed in Sharif (2012), Hong Kong has implemented numerous policies to promote innovative entrepreneurship since the late-1990s. Shifting away from laissez-faire governance, the government has moved towards an "innovation systems" approach (Sharif, 2010) and implemented policies like providing funding and incubation support to small and medium enterprises (Sharif, 2012). The government's commitment to the development of innovation and technology also features heavily in several Chief Executives' policy agendas. Most notably, in 2017, then Chief Executive, Carrie Lam, highlighted the need for the government to play a greater role in promoting innovation and technology, with her government making unprecedented strides in terms of policies implemented to promote this sector.

Both economies saw a significant transformation in their innovative entrepreneurship landscape in the last two decades. While Singapore started to move towards the knowledge-economy and embrace innovation in the late-1990s (Foo and Foo, 2000), entrepreneurship take-up remained weak (Wong et al., 2001). On the other hand, while Hong Kong has a rich history of entrepreneurship predominantly in trading and manufacturing (Yu, 1997), the city's performance in moving towards an innovation economy remained sluggish (Fuller, 2010).

Today, both Singapore and Hong Kong reveal a high-performing entrepreneurial ecosystem which has produced significant levels of innovative entrepreneurship. To qualify Singapore and Hong Kong as high-performing entrepreneurial ecosystems, the prevalence of high-growth firms (Henrekson and Johansson, 2010; Stam, 2015) with the number of innovative startups formation is used as the main indicator. Innovative startups refer to "knowledge-intensive startups based on innovation in products, production techniques, and/or commercialisation" (Grilli et al., 2022, p.1). Hong Kong has about 413 startups per 1 million population while

[12] While Hong Kong is a non-sovereign city, it is often compared to a city-state due to its high degree of autonomy.

Singapore is home to approximately 701 start-ups per 1 million population (Hammond & Ruehl, 2020). Moreover, both economies have ranked highly in startup ecosystems rankings in the world. In a 2017 ranking, Singapore is ranked at 12th place while Hong Kong is ranked at 25th place (Start-up Genome, 2017). While some scholars suggest that the number of unicorns (start-up with a valuation of over US$1 billion) present is a much better indicator for the performance of the entrepreneurial ecosystem (Acs et al. 2017; Bruns et al., 2017), this paper contends that using unicorns is too narrow an indicator. Unicorns are rare and using them as an indicator will render many existing entrepreneurial ecosystems with zero output (Stam and Van de Ven, 2021).

3.2.2 Data sources and data collection

The main method used to collect data for this research is semi-structured interviews. To complement the interviews, data from government reports are also used to provide an overall picture of Singapore and Hong Kong's entrepreneurial ecosystem as well as identify key events and structure of the entrepreneurial ecosystem. This helped us to structure the interviews and the case narratives. A list of the government reports used is provided in the Appendix (Table A1).

A total of 34 semi-structured interviews were conducted using an interview guide that comprised three themes: the key drivers of the entrepreneurial ecosystem, government's policies that affected the ecosystem, and the participant's experience in the ecosystem. The study applied a purposive and snowball sampling logic to select interview participants (Patton, 1990). Seeing that the entrepreneurial ecosystem concept is not industry-specific unlike other concepts such as industrial districts and clusters (Autio et al., 2018; Pitelis, 2012), the range of sectors was not considered when recruiting participants. In line with Brown and Mason's (2017) analytical categories of the three main types of key players within the entrepreneurial ecosystem, the selection criteria for interview participants consisted of (i) being either an entrepreneurial actor (eg. founder, role model), entrepreneurial resource provider (eg. accelerator, investor, policymaker) or entrepreneurial connector (eg. former founders, serial entrepreneurs) and (ii) being based in Singapore or Hong Kong. Considering the different perspectives of different players in the entrepreneurial ecosystem helped to achieve triangulation (Patton, 1990). Using these criteria, over 101 eligible participants were initially contacted through LinkedIn. Ongoing interviews were conducted with participants who replied and consented, and snowball sampling was used to recruit further participants. The data collection was stopped when ongoing analysis of the interviews revealed that data saturation was achieved. A total of 14 interviews were conducted in Singapore and 20 in Hong Kong (Table 1).

Combining the recruitment of participants from searching on LinkedIn as well as obtaining referrals for the interviews through a variety of mutually independent sources helped to minimise the risk of sampling bias due to the resultant sample being not random and incomplete. At the same time, the backgrounds of the interviewees are well distributed among the three different types of players (entrepreneurial actors, entrepreneurial resource provider, entrepreneurial connector) in the entrepreneurial ecosystem (Brown and Mason, 2017), thus reducing the risk that the findings may be skewed towards a certain perspective resulting from one actor group. The interviews lasted between 30 minutes to 90 minutes and were recorded with participants' consent.

The semi-structured interviews with the three types of players in the entrepreneurial ecosystem provided for a comprehensive overview and understanding of the two entrepreneurial ecosystems for the data analysis as I was able to gather information from three different perspectives. During the interviews, participants were able to identify and describe their own situations as well as relate what they have went through personally (Myers, 1997). Interviews were conducted both in-person and on Zoom between May to October 2021. Details of the participants are provided in the Appendix (Tables A2 and A3).

Table 1. Description of key interviewees

Type	**Number in Singapore**	**Number in Hong Kong**
Entrepreneurial actor eg. founder, role models	6	9
Entrepreneurial resource provider eg. accelerator, incubator, investor, policymaker	9	9
Entrepreneurial connector eg. former founders, serial entrepreneur, matching services	6	7

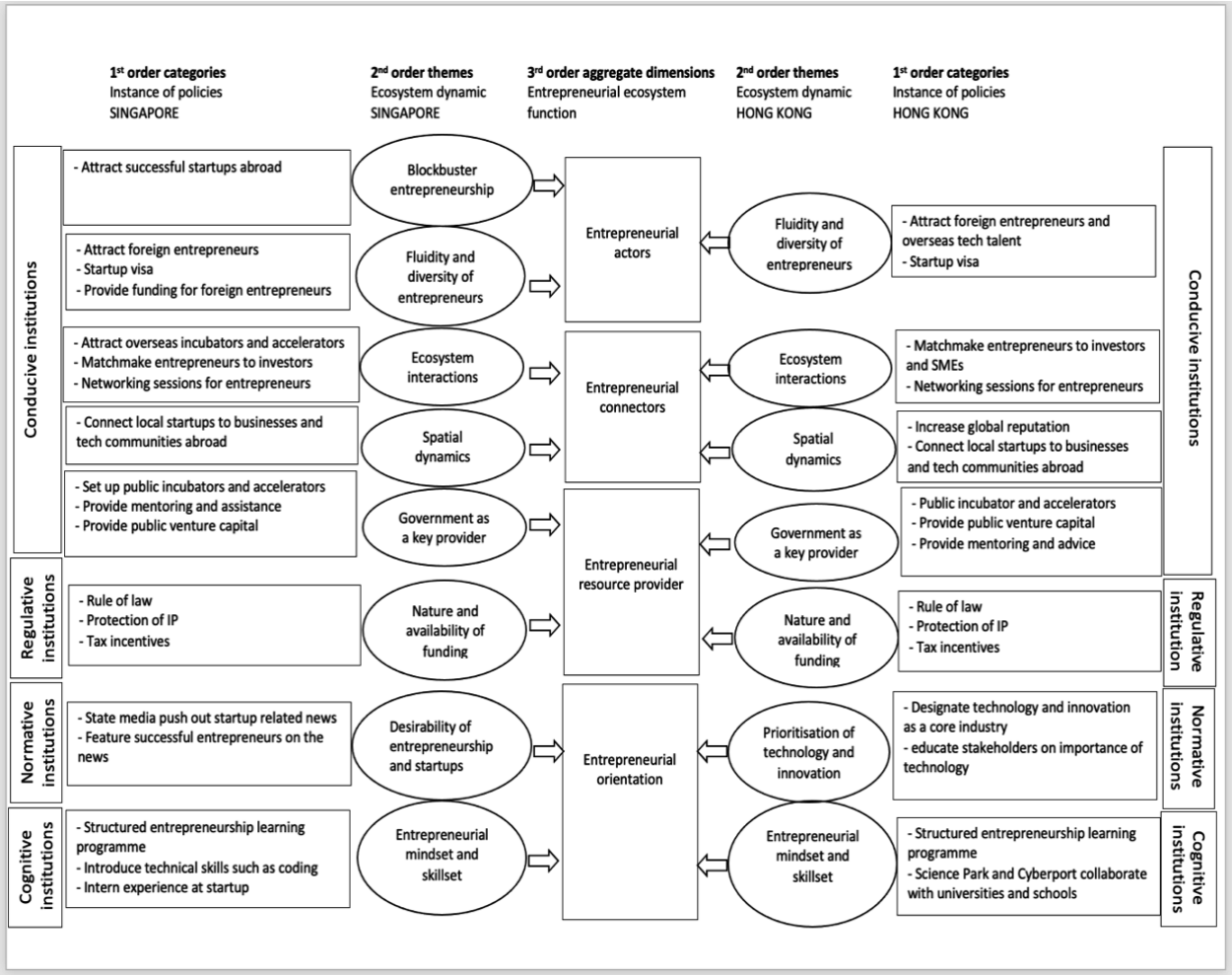
Note: Some interviewees fall into more than one type (eg. some investors used to be entrepreneurs)

3.2.3 Data analysis

The interviews were transcribed before coding and analysing the data thematically on the NVivo software (Bryman, 2016). For the first round of coding, which resulted in 1st order concepts, I

started with the preconceptions of the four institutional pressures (Scott, 1995; 2001; Stenholm et al., 2013). I coded with a preliminary scheme to explore categories that describe the different types of government policies. For the second round of coding, abstract themes that described the government policies which interacted with the entrepreneurial ecosystem were created. I then compared the emerging themes and established their potential relationships (Corbin and Strauss, 2014). In the final round, I further combined the 2nd order themes into aggregate dimensions (Gioia et al., 2013) that reflected key entrepreneurial ecosystem coordinative aspects (Brown and Mason, 2017). Figure 2 shows the data structure that emerged through the data coding process. To increase the study's reliability, a triangulation approach is adopted (Mathison, 1998) where the semi-structured interviews were complemented with documentary analysis of secondary data such as government reports and policy addresses. Detailed interview quotes are provided in the Appendix (Table A4).

Figure 2. Data Structure



3.3 Findings

This section presents the results on how government policy affects the development of the entrepreneurial ecosystems in Singapore and Hong Kong through the lens of institutional theory: regulative, cognitive, normative, and conducive institutions. Policies help to foster ecosystem dynamics that affect the coordinative aspects of the entrepreneurial ecosystem.

3.3.1 Entrepreneurial actor

The analysis of the results reveals that policies affecting the conducive institutional environment promote the development of the entrepreneurial ecosystem by (i) creating blockbuster entrepreneurship, and (ii) increasing the fluidity and diversity of entrepreneurs. Bringing in successful startups from abroad helps to create blockbuster entrepreneurship, which can have strong effects on the growth of the ecosystem by contributing to spillover effects such as mentors, role models and angel investors (Isenberg, 2010; Feldman 2014). This is seen in Singapore, where an interviewee noted that "what Singapore has done a good job is in attracting the best startups in Southeast Asia to come to Singapore at a certain stage…if they are in the super-seed or pre-A or series A stage, that's when Singapore would try to lure them to set base here" (EC 1 Interview). The interviews with the entrepreneurs also stressed on the crucial role blockbuster entrepreneurship play in the ecosystem in terms of inspiring others and providing advice to younger entrepreneurs.

Second, attracting non-native entrepreneurs helps to increase the fluidity and diversity of entrepreneurs within the local ecosystem. The presence of "transnational entrepreneurs" can help to promote knowledge transfer (Saxenian, 2007) and prevent "lock in" within entrepreneurial ecosystems (Ciravegna, 2011). This is done via immigration policies, primarily in the form of issuing "entrepreneurship visas". In Singapore, this is known as the "Entrepass Visa" which was started in 2003 and issued to foreign founders, allowing them to operate their startup in Singapore.[13] In Hong Kong, this takes the form of the "Hong Kong Startup Visa" which was initiated in 2015, aimed at attracting foreign entrepreneurs to relocate their startups to Hong Kong. While there are no statistics to account for the number of foreign entrepreneurs who immigrated to Hong Kong under this scheme, a startup survey done by InvestHK in 2020 revealed that 26% of the startup founders in Hong Kong originated from outside the city (ERPH 3 Interview). The

[13] It is estimated that there were at least 200 to 400 Entrepass holders at any point between 2013 to 2017 (MTI, 2022). Considering the total number of startups in 2017 to be around 1600 to 2400 (Startup Genome, 2017), this would mean that foreign founders constituted at least 8.3% of total founders in 2017.

two governments have focused on attracting talented tech individuals to resolve problems related to human capital within the local ecosystem, contributing to further diversity and fluidity of entrepreneurs.

3.3.2 Entrepreneurial connector

The analysis of the results reveals that policies affecting the conducive institutional environment promote the development of the entrepreneurial ecosystem by stimulating (i) ecosystem interactions and (ii) spatial dynamics. In Singapore, the government has been fostering ecosystem interactions through a variety of policies including attracting foreign accelerators and incubators, engaging external organisations, and providing matchmaking services. As the interviewers suggested, the government has put in a lot of effort to attract international organisations to enter Singapore to set up incubators and accelerators via the use of incentives and negotiations with these organisations (EC 1 Interview; ERP 6 Interview). One example is the UK-based accelerator, Entrepreneur First, which established its office in 2016 after a partnership with the Singapore government organisation, Singapore's Infocomm Investments (TechinAsia, 2016).

Moreover, the government engages private organisations to create entrepreneurial networks and build up entrepreneurial communities. These external parties are regarded as "multipliers" where they can help to further the intended goals of the government. Recognising that it is both costly and inefficient to grow the entrepreneurial ecosystem through its own resources, the Singapore government engages other actors within the entrepreneurial ecosystem to provide support to the startups. The government typically provides funding to such external bodies and these organisations are in turn tasked to carry out a range of activities aimed at supporting entrepreneurs at the pre-seed to post-seed stages.

Additionally, the government has initiated numerous networking sessions to foster connections not only amongst entrepreneurs but also between entrepreneurs and other actors in the ecosystem. As an entrepreneur indicated, the networking session organised by the government allowed him to network with local established entrepreneurs which would otherwise have been impossible to connect with on the personal level (EA 1 Interview). Aside from such networking sessions organised by the government, entrepreneurs also noted that government organisations were also helping to "matchmake" them to potential partners or investors and that they could also seek the government's help in connecting to other key stakeholders through the government's own network (EC 3 Interview; EC 4 Interview). We see that public policy aimed at fostering ties

between entrepreneurs and other stakeholders is typically done through activities such as matchmaking or dedicated networking sessions.

In Hong Kong, policies fostering ecosystem interactions primarily take the form of business and solution matching and investment matching. Several different agencies under the government are involved in building connections and linking up different groups of stakeholders in the ecosystem, such as the Hong Kong Science and Technology Park (HKSTP) and Cyberport. The two agencies have their respective mandates, and they help founders build connections at different stages of their growth, fostering connections and collaborations within the local ecosystem. For example, Cyberport has helped startup founders connect with both small local enterprises and big corporations based in Hong Kong. Some of the big corporations which Cyberport conducted business matching with startup founders include Amazon, IBM, and Microsoft (ERPH 5 Interview). The government also created programmes to facilitate investment matching opportunities. One example is Cyberport's flagship event, the Cyberport Venture Capital Forum (CVCF), which has facilitated over 300 deal flows since its inception in 2014 until 2021 (Cyberport, 2021). Startups can fundraise by meeting top-notch investors such as Alibaba Group and Blue Pool Capital.

Government policies also led to the enhancement of spatial dynamics of the ecosystem where they help local entrepreneurs expand their businesses overseas. In Singapore, interviewees brought up the Scale-up SG and the Global Innovation Alliance (GIA) programmes by Enterprise Singapore (EA 1 Interview; EC 2 Interview). These programmes help connect local startups to businesses and tech communities abroad and bring together local entrepreneurs with other ecosystem players. The GIA programme currently operates in 16 cities worldwide and Singapore-based startups can apply to these programmes to prepare themselves for market expansion. For example, GIA partners with IoT Tribe in London and Singapore-based startups can apply to participate in the London Tech Calling Accelerator Programme. These governmental programmes are crucial to the local ecosystem as they foster global ties, helping Singapore-based startups to gain resources for international expansion by providing access to opportunities that they otherwise would not have gotten.

In Hong Kong, spatial dynamics are fostered through agencies such as InvestHK where policies include policymakers going overseas to promote the global reputation of Hong Kong as a startup destination, supporting overseas startups to establish themselves in Hong Kong, and helping local startups venture abroad. As one interviewee suggested, "We have a lot of missions to go outside Hong Kong to partner with other innovation hubs, accelerators, or through

government-to-government alliance, to build a lot of MOUs with our counterparts in Thailand, Japan, US and UK" (ERPH 5 Interview). The government fosters local networks within the ecosystem and establishes overseas networks which can offer different advantages like mentoring opportunities and spillovers.

3.3.3 Entrepreneurial resource provider

For entrepreneurial resource provider, the analysis of the results reveals that (i) policies affecting the conducive institutional environment saw the government taking up the role as a key resource provider in the ecosystem while (ii) policies affecting the regulative institutional environment influenced the nature and availability of funding.

First, government policies increase the amount of resources available within the entrepreneurial ecosystem for entrepreneurs to access. The government acts as a key resource provider by providing public venture capital and establishing public accelerators. In Singapore, the government provides public finance to entrepreneurs through various funding schemes. The provision of public venture capital is a strong feature of Singapore's entrepreneurial ecosystem (ERP 2 Interview; ERP 5 Interview; EA 1 Interview; EA 2 Interview). The provision of public finance is not just limited to early-stage funding but encompasses all the phases of the startup's journey. The comprehensive range of public venture capital schemes have allowed for a full range of public funding sources across the entire funding escalator. Moreover, the government has established public accelerators to support startups in their growth. This type of specialist infrastructure is crucial as they help support startup growth with mentoring, coaching, and funding opportunities (Clarysse et al., 2015). Examples of prominent public accelerator programmes in Singapore that interviewees mentioned included the Jurong Town Corporation (JTC) Launchpad and SG Innovate.

Likewise, the Hong Kong government provides public venture capital to startup founders across the funding escalator. Entrepreneurs can apply for seed capital funding up to HK$100,000 from government organisations such as Cyberport and HKSTP (ERPH 5 Interview; EAH 1 Interview). The government launched a co-investment scheme in 2017 known as the Innovation and Technology Venture Fund (ITVF) with a fund of HK$2 billion (ITF, 2022). The ITVF is targeted at Hong Kong innovation and technology startups, with a matching investment ratio of HK$1 from the fund for every HK$2 invested by its co-investment partner. However, while there are public venture capital policies in Hong Kong, most interviewees noted that it remained

difficult for early-stage and middle-stage startups to receive public funding and most of the funding opportunities were predominantly for the late-stage startups (ERPH 2 Interview).

The government has also established public incubators and accelerators to support startup growth, through two key organisations: the HKSTP and Cyberport. The HKSTP primarily targets startups that specialise in deep tech whereas Cyberport targets startups in the digital tech industry. In this regard, the government acts as an entrepreneurial actor in the ecosystem by providing support to startups through its incubators and accelerators. Out of the current nine unicorns (startups with a valuation of US$1 billion) in Hong Kong, five of them participated in Cyberport's incubation programme (ERPH 5 Interview). The benefits of such government programmes is encapsulated by one entrepreneur: "if you are not with any of those incubators or accelerators, I think it will be quite difficult for you to actually have a mentor to guide you and connect you to the different industries and venture capital funds" (EAH 6 Interview).

Second, in term of policies influencing the nature and availability of funding, policies were mainly related to regulative institutions. In Singapore, the government has actively created new private sources of venture capital by attracting overseas venture capital to set up base in the country. The nature and availability of funding spans across public and private sources and there exists a wide range of funding sources across the funding escalator for local startups. The Singaporean government recognised the importance of private funding and has created an environment that is conducive and safe for overseas venture capitalists (VCs) to relocate to Singapore, which include a simple tax system and the presence of strong Intellectual Property (IP) laws (ERP 3 Interview; EC 1 Interview). In a study by fDi Intelligence (2020) on Global Venture Capital between 2010 and 2019, Singapore was ranked the 3rd most popular city with 113 inbound greenfield FDI project.

In Hong Kong, the government created a favourable environment for private venture capital initiatives. There exists a range of funding sources across the funding escalator across both public and private venture capital. Policies take the form of indirect support such as rule of law and IP protection, tax incentives and business friendly policies that contribute to the ease of doing business (EAH 6 Interview; ERPH 3 Interview). Interviewees also noted that Hong Kong's status as a global financial centre coupled with its role acting as a bridge between mainland China and international markets have also helped to attract private venture capital funds to set base in the city. Between 2010 to 2020, Hong Kong raised the most Initial Public Offering (IPO) funds globally for seven years (ERPH 3 Interview).

3.3.4 Entrepreneurial orientation

For entrepreneurial orientation, the analysis reveals that policies influencing the normative institutional environment enhanced positive societal norms which are conducive to innovative entrepreneurship while policies influencing the cognitive institutional environment cultivated an entrepreneurial mindset and skillset.

First, for policies generating positive societal norms for entrepreneurship, in Singapore, the government has constantly pushed out startup-related news to the general populace, increasing the desirability of entrepreneurship and startups within society. One interviewee noted that the national newspaper, *Straits Times* is now featuring more and more tech professionals and startup founders, showcasing their successful career pathways, as compared to the past where typically only traditional careers such as doctors and lawyers are featured (ERP 3 Interview). News of successful startups and entrepreneurs are often being fed to the media outlets by the government and likewise, media outlets seek the government's perspectives on certain viewpoints and content pieces (ERP 6 Interview). Local news are often used to promote and celebrate local entrepreneurship. This not only helps to promote the idea of founding a startup as a plausible alternative career option for Singaporeans, but also highlight the fact that startup founders are not only associated with failure and that their businesses can be successful. The presence of these role models on the media also helps to inspire more individuals to take up startup careers by showing that such a career pathway has been "tried and tested" in Singapore.

In Hong Kong, the government promotes and prioritises technology and innovation, encouraging society's embrace of technological solutions. As one interviewee suggested, the government has a clear focus on developing technology and innovation in Hong Kong, where part of the work it does is to integrate the traditional core sectors of Hong Kong's economy such as property and finance with innovation and technological solutions (ERPH 3 Interview). The increasing acceptance of innovation can influence both the attractiveness of founding a startup and the uptake of technological solutions offered by these high-growth startups. The government also runs educational campaigns to different stakeholders to help them understand the benefits of technology and innovation and to clarify misunderstandings on the myth that new technological solutions will replace existing jobs.

Second, for policies influencing the cognitive institutional environment help to cultivate an entrepreneurial mindset and skillset. Policies primarily include education policy where the curriculum is modified to include learning of skills essential for an entrepreneurship career. In Singapore, policies include exposing high school and university students to entrepreneurship and

cultivating essential skills needed for an entrepreneurship career. The government has reformed educational policies to include technical skills programmes whereby students are exposed to coding and cybersecurity (ERP 3 Interview; ERP 5 Interview). The educational system has also seen a less focus on grades, with more emphasis on students' holistic development, which is aimed at fostering creativity amongst students. As one interviewee noted, "I think they're trying to inculcate a different type of thinking and a different type of way of working" (ERP 6 Interview). High schools are given funding to implement entrepreneurship learning programme and students are paired with senior entrepreneurs while universities incorporate an entrepreneurship curriculum for students to try out working for a startup locally or overseas.

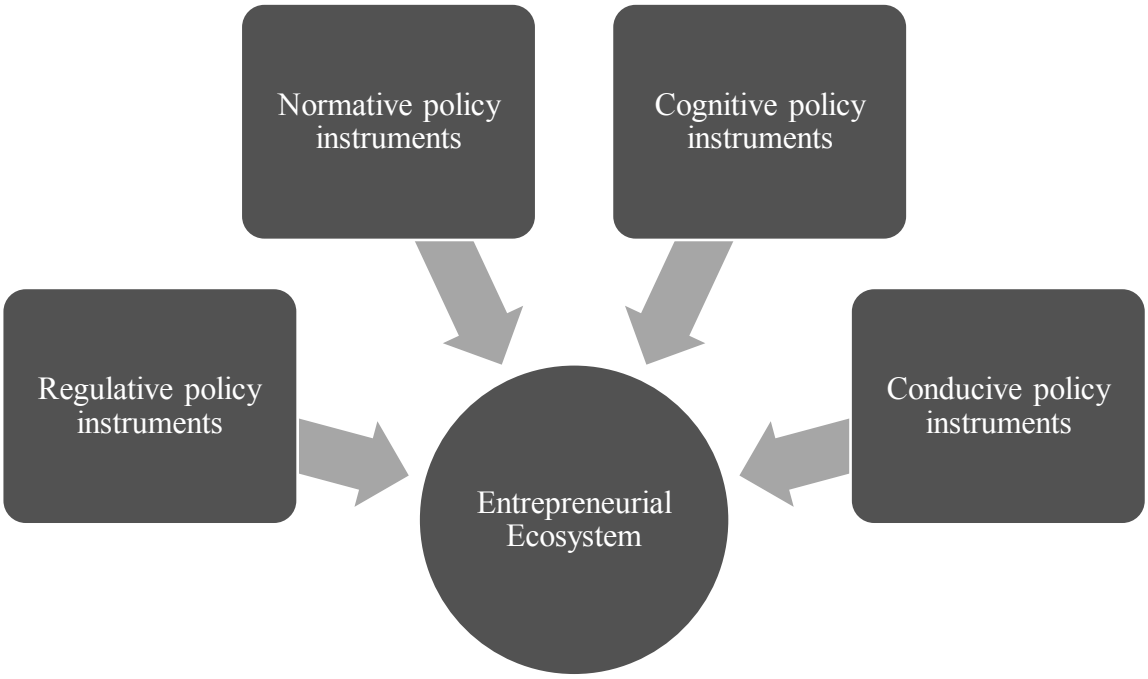
In Hong Kong, the government has reformed education policies to include more entrepreneurship elements within the curriculum at the high school and university level. At the university level, public universities such as University of Hong Kong (HKU) and the Chinese University of Hong Kong (CUHK) have dedicated entrepreneurship centres which implement entrepreneurship programmes, entrepreneurship bootcamps, hackathons and incubation support to develop students' interest in entrepreneurship (EAH 5 Interview; ECH 5 Interview). Outside of the educational institutions, HKSTP and Cyberport also regularly carry out workshops and events targeted at students to encourage them to kickstart their own startups (ERPH 2 Interview). At these events, students are exposed to things such as what is a startup and the journey of founding a startup, and meeting startup founders.

3.4 Discussion

Overall, the findings show that government policies contribute to the development of the entrepreneurial ecosystem by influencing ecosystem dynamics under the four main coordinative aspects: entrepreneurial actors, entrepreneurial connectors, entrepreneurial resource providers, and entrepreneurial orientation. Government policies promoting the entrepreneurial ecosystem's development appear to take the form of a policy mix where different policy instruments are combined (Flanagan et al., 2011; Howlett and Rayner, 2008). Policies coded under conducive institutions fostered ecosystem dynamics (eg. ecosystem interactions, fluidity, and diversity of entrepreneurs) underlying three ecosystem coordinative aspects: entrepreneurial actors, entrepreneurial connectors, and entrepreneurial resource providers. Policies coded under regulative, normative, and cognitive institutions contributed to the ecosystem dynamics (eg. nature and availability of funding, desirability of entrepreneurship) underlying two coordinative aspects: entrepreneurial resource provider and entrepreneurial orientation. To effectively develop

entrepreneurial ecosystems, governments need to come up with a "entrepreneurial ecosystem policy mix" as different ecosystem dynamics are fostered by different policy instruments. This is in line with studies suggesting that policies to support the entrepreneurial ecosystems need to be more systemic in nature instead of being "siloed" in nature (Stam, 2015; Wurth et al., 2022). While different policies affecting different institutions stimulate ecosystem dynamics respectively, the multitude of policies work collectively to promote the development of the entrepreneurial ecosystem (Figure 3). Implementing an "entrepreneurial ecosystem policy mix" with regulative, normative, cognitive, and conducive policy instruments is the key to promoting the development of the entrepreneurial ecosystem.

Figure 3. Entrepreneurial ecosystem policy mix



The comparison of Singapore and Hong Kong also reveals that there are multiple configurations of policies which are effective in promoting the development of the entrepreneurial ecosystem. Policy mixes for the entrepreneurial ecosystem are varied due to different types of policy instruments chosen to foster the lacking ecosystem dynamics based on the local context. In Hong Kong, we find normative policy instruments related to technology promotion instead. These instruments were aimed at fostering the importance of technology and innovation within

Hong Kong's society, where uptake of innovation and technology was comparatively weaker compared to other Asian cities. Hong Kong's economy, mainly driven by the financial sector and real estate industry, coupled with the government's stance of positive non-interventionism, saw the government's inertia in kickstarting the technology and innovation industry only until the late-1990s. Despite the efforts made by then-Chief Executive Tung, such as designating core industries for innovation and setting up the HKSTP, the promotion of innovation and technology faced produced lacklustre results.

However, in Singapore, we did not find normative policy instruments concerning innovation and technology promotion but instead policy instruments were related to media's dissemination of startup and entrepreneurship-related news. This is because the prioritisation of technology and innovation has been a key goal in Singapore's policies since the early-1990s, with its move towards a knowledge-intensive economy. The National Science and Technology Board (NSTB) was established in 1991 to formulate strategic long-term plans for technology development and has released seven 5-year plans on science and technology to date. Thus, policy instruments were more focused at fostering the desirability of entrepreneurship and startups within Singapore's society, where citizens generally preferred working for an employer to starting a new business due to the lack of certainty and precarious nature in the latter. Thus, while both Singapore and Hong Kong may have similar overarching strategy of developing their local entrepreneurial ecosystems, the policy mix that both governments have adopted are different as different policy instruments are combined and adjusted according to local contexts.

Moreover, the study also highlights the significance of the "top-down" governance model of developing entrepreneurial ecosystems with the "visible hand" of the government (Colombo et al., 2019) especially in the "early growth" stages of the entrepreneurial ecosystem. The cases of Singapore and Hong Kong illustrate the central role the state played in the early growth of the entrepreneurial ecosystem where government policy facilitated and fostered key ecosystem dynamics. This is in line with studies that suggest that the government often plays the role of a creator and is crucial to the early growth of the entrepreneurial ecosystem (Candeias and Sarkar, 2022; Wang et al., 2022) as opposed to the idea that the entrepreneurial ecosystems can develop naturally (Spigel and Harrison, 2018).

3.4.1 Theoretical implications

The results informed a theoretical framework of government policy contributing to ecosystem development by influencing ecosystem dynamics. This contributes to our understanding of the

entrepreneurial ecosystems in three main ways. First, by showing the strong relationship between government policy and the development of the entrepreneurial ecosystem, the paper emphasises the importance of the government as a key actor in the entrepreneurial ecosystem. It provides empirical evidence that the nature of an ecosystem is much more than being self-organised and self-sustaining. As a central actor in the early-growth stages of the entrepreneurial ecosystem, the government contributes to ecosystem development by fostering ecosystem dynamics through implementing various public policies targeting the different coordinative aspects of the entrepreneurial ecosystem. The findings are consistent with studies that suggest the top-down approach of governing entrepreneurial ecosystems (Audretsch and Belitski, 2017; Lehmann and Menter, 2017). Through the cases of Singapore and Hong Kong, the paper provides a detailed account of how government policy fosters different ecosystem dynamics affecting the coordinative aspects of entrepreneurial ecosystem, in turn affecting the growth of the ecosystems in their early-growth stages. A key insight is that governments can build entrepreneurial ecosystems, where they "could be created and governed by a Chandlerian 'visible hand'" (Colombo et al., 2019, p.422). Additionally, through various policy instruments, the government can provide the necessary resources and act as a "feeder" of the ecosystem (Stam, 2015). Policymakers can identify the necessary public policies needed to develop their local entrepreneurial ecosystems based on the existing structure and the different types of attributes and resources in their own ecosystems (Spigel, 2018). Informed by institutional theory, this top-down, structural perspective of ecosystem evolution offers a theoretical alternative to the bottom-up, process perspective of ecosystem evolution.

Second, the findings provide a more nuanced understanding of the coordinative aspects of entrepreneurial ecosystem development. The approach of studying an ecosystem's development via the four different dimensions of coordinative functions of the ecosystem, specifically the entrepreneurial actor, entrepreneurial resource provider, entrepreneurial connector, and entrepreneurial orientation (Brown and Mason, 2017) provided evidence of a top-down structural model where public policies can foster different ecosystem dynamics and influence the four main coordinative aspects of the ecosystem. For example, policy instruments such as entrepreneur-investor matchmaking sessions can help to foster ecosystem dynamics such as ecosystem interactions under the entrepreneurial connector coordinative aspect. The findings also extend Brown and Mason's (2017) typology of two "idealised" types of ecosystems (scale-up vs embryonic) by proposing new ecosystem dynamics relevant to entrepreneurial orientation such as desirability of entrepreneurship and startups, prioritisation of technology and innovation, and

entrepreneurial mindset and skillset. For example, a scale-up ecosystem would reveal a high social status for entrepreneurship where founding a startup is seen as desirable whereas an embryonic ecosystem would feature a low social status for entrepreneurship and founding a startup would be less desirable. These new insights help to enrich our understanding of ecosystem dynamics pertinent to entrepreneurial orientation as the current framework proposed by Brown and Mason (2017, p.23) only includes the level of ambition of entrepreneurs in this category.

Third, the study adds on to new knowledge on city-state entrepreneurial ecosystems. Existing studies often study entrepreneurial ecosystems at the city-level, regional-level, and country-level. While such studies are important, the insights we gain may not be readily transferrable to city-state entrepreneurial ecosystems. For example, city-state entrepreneurial ecosystems lack a "larger" ecosystem which other city-level entrepreneurial ecosystems may be embedded in or be closely linked in terms of ecosystem networks and ties. This study is also one of the first few comparative studies on city-state entrepreneurial ecosystems and on the interactions between government policy and the ecosystem dynamics. Recent attempts have been made to compare entrepreneurial ecosystems in terms of configurations (Belitski and Buyukbalci, 2021; Spigel, 2017) and development trajectories (Kapturkiewicz, 2021) but comparative studies remain an underdeveloped area in entrepreneurial ecosystems research as most studies focus on single case studies (Harima et al. 2021).

3.4.2 Practical implications

Aside from theoretical implications, the study offers important policy and practice contributions. The study provides an example of how governments, especially in small and open economies, can implement policies to develop their entrepreneurial ecosystems. The findings show that government has a strong role to play in fostering the development of the entrepreneurial ecosystem. The development of entrepreneurial ecosystems depends on a combination of government policies targeting conducive, regulative, normative, and cognitive institutions. With a greater understanding of how government policies affect the development of the entrepreneurial ecosystems, policymakers can come up with effective policies to promote the growth of innovative entrepreneurship for innovation-led economic growth.

The findings indicate that policymakers could implement policies which emphasise on fostering conducive institutions. This is line with Stenholm et al. (2013, p.189) who argue that policies designed to enhance high-growth entrepreneurship are in a better position if they focus on the conducive dimension, such as university-industry collaboration and availability of venture

capital. However, going further than Stenholm et al. (2013), I propose that policymakers can adopt a "policy mix" with a combination of policies to achieve their desired entrepreneurial ecosystem outcomes. The findings of this comparative research suggest that governments can use a "policy mix" with different combinations of policy instruments to foster different ecosystem dynamics (equifinality) to reach the same outcome of a developed entrepreneurial ecosystem. Depending on their local contexts, policymakers have a variety of policies to choose from the categories of conducive, normative, regulative, and cultural-cognitive interventions, depending on which entrepreneurial ecosystem dynamic they want to foster. Evident from the results, there is no "one size fit all" policy mix and an effective "entrepreneurial ecosystem policy mix" can take different configurations.

In particular, the key difference in the two entrepreneurial ecosystem policy mix of Singapore and Hong Kong lies in policy instruments relating to entrepreneurial orientation. Policy instruments relating to entrepreneurial actor, entrepreneurial resource provider, and entrepreneurial connector are largely similar. This hints at the fact that policies promoting entrepreneurship cannot adopt the "Silicon Valley" model wholesale and policymakers need to consider contextual differences, such as entrepreneurship culture when coming up with their own policy mix to develop their entrepreneurial ecosystems (Dahlstrand and Stevenson, 2019). At the same time, the findings reveal that government policy can go beyond providing resources and enabling access to resource (Spigel and Harrison, 2018) within the entrepreneurial ecosystem, but also influence the entrepreneurial culture. As the cases of Singapore and Hong Kong reveal, government policy can also make use of normative and cultural-cognitive institutions to stimulate various ecosystem dynamics and effect a change in the entrepreneurial orientation, promoting the development of the entrepreneurial ecosystem.

Additionally, the findings suggest that policies that are not earmarked as entrepreneurship policy also have the effect of fostering innovative entrepreneurship (Acs et al., 2016). Policymakers should also look towards broad-based public policies such as education policies that promote critical learning and explorative thinking as well as labour policies aimed at attracting foreign talent when developing their local entrepreneurial ecosystems. Building on Acs et al.'s (2016, p.36) findings which revealed that Western world entrepreneurship policies are largely ineffective and are a waste of taxpayers' money, this study examines two Asian cases and demonstrates that entrepreneurship policy is still crucial as it can help increase the quality of entrepreneurship. While entrepreneurship policy tends to target individuals who want to become entrepreneurs in the first place, resulting in little impact on the quantity of entrepreneurial activity

(Acs et al., 2016), the findings here reveal that entrepreneurship policies which target conducive institutions can help to increase the quality of entrepreneurship through means such as an increase in resources or new networks formed for startup founders. For example, the policies on fostering ties between entrepreneurs and investors and amongst entrepreneurs can help startup founders to gain the needed resources or knowledge that they otherwise would not have gotten. This highlights the importance of entrepreneurship policy for the growth of innovative entrepreneurship and that policymakers should retain such a policy focus. To effectively promote both the quantity and quality of entrepreneurship, policymakers need to combine policies earmarked as entrepreneurship policies with other general broad-based public policies aimed at correcting other market failures in the economy.

3.5 Conclusion

To develop a better understanding of how government policies can affect the development of the entrepreneurial ecosystem, this paper used institutional framework (Scott, 1995; 2001; Stenholm et al., 2013) and entrepreneurial ecosystem dynamics (Brown and Mason, 2017) to structure the investigation and theorising. Institutional framework allowed us to classify government policies and analyse their impact while the entrepreneurial ecosystem coordinative aspects (Brown and Mason, 2017) provided a lens to study the development trajectory of the entrepreneurial ecosystem over time.

Despite current literature on the key factors crucial for the development of entrepreneurial ecosystems (Cao and Shi, 2020; Colombelli et al. 2019), there remains little empirical studies on ecosystem dynamics (Alaassar et al., 2022). Overall, by delineating the ecosystem dynamics which government policies helped to foster, the study contributes to research on both the role of the state within the entrepreneurial ecosystems as well as how entrepreneurial ecosystems evolve and develop. The study also illustrates that an "entrepreneurial ecosystem policy mix" is needed when it comes to promoting the growth of the entrepreneurial ecosystem as combinations of policy instruments are needed to address different local conditions. More importantly, by highlighting the active role the state plays in fostering early-stage ecosystem growth, the study argues for more policymakers to follow the "top-down" governance model of entrepreneurial ecosystems instead of letting their ecosystems develop naturally. In light of the emphasis on innovation-led economic growth in many countries, this research further clarifies the role governments can play in the development of the entrepreneurial ecosystem and provides a basis for policymakers to promote innovative entrepreneurship. This is not only relevant for advanced

economies like Singapore and Hong Kong, but also for middle-income countries seeking to escape the "middle-income trap" (Paus, 2018) by developing technological capabilities.

There are limitations to this study. First, this study is based on only two cases and the findings may not be generalisable to other settings. Large-scale quantitative research can be carried out to test the findings. Second, this study focuses on small and open economies, and further research needs to be conducted to study if these findings are generalisable to other contexts. Last, the study used the number of startups formation as the main indicator when identifying successful entrepreneurial ecosystems producing productive entrepreneurship, which can be controversial to some. Incorporating other indicators such as sales of new products or revenue production can make the findings more persuasive. Future research can expand on the study by using a similar framework to investigate entrepreneurial ecosystems in Western countries such as Denmark and United Kingdom. This can possibly lead to a typology of different types of government policies used to promote the growth of entrepreneurial ecosystems. Research can also explore temporal shifts, to study the extent of policy shifts over time as the entrepreneurial ecosystem develops and matures. While this study has argued for the "top-down" governance model in developing entrepreneurial ecosystems, the study has focused on the early-stages of ecosystem growth. Future studies could investigate if the state takes a "back-seat" and if the governance model may change to a "bottom-up-top-down" or "bottom-up" approach as the entrepreneurial ecosystem evolves. Moreover, future research can also focus on specific industries, to study the extent to which governments policies for entrepreneurial ecosystem differ across industries. For example, studies can investigate the differences in government policies to develop the fintech entrepreneurial ecosystem versus biotech entrepreneurial ecosystem in Singapore.

Last, future research could also investigate into the potential negative consequences of government policies for the development of the entrepreneurial ecosystem. For example, government policies attracting more foreign entrepreneurs into the local entrepreneurial ecosystem may lead to certain negative implications, such as social exclusion for foreign entrepreneurs (Neumeyer et al., 2019) and inequitable access to grants for local entrepreneurs (Lall et al., 2019). For example, in a study on grant funding applications across 92 developing countries, Lall et al. (2019, p.880) found out that irrespective of prior education and working experience, foreign entrepreneurs born in developed countries are more likely to receive the funding than their local counterparts. This suggests that a potential gap in funding access for local entrepreneurs may occur as government policies attract more foreign entrepreneurs into the

entrepreneurial ecosystem, especially in the developing country context. A potential future study could extend this research and uncover the barriers or downsides that government policies aimed at promoting the entrepreneurial ecosystem, pose to local entrepreneurs.

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Appendix

Table A1. Details of government reports

	Singapore	**Hong Kong**
1.	5 year plans - 2001 to 2005: Science and Technology Plan - 2006 to 2010: Science and Technology Plan - 2011 to 2015: Research, Innovation and Enterprise Plan - 2016 to 2020: Research, Innovation and Enterprise Plan	Chief Executive's Policy Addresses - 2000 (Tung Chee-hwa) - 2001 (Tung Chee-hwa) - 2002 (Tung Chee-hwa) - 2003 (Tung Chee-hwa) - 2004 (Tung Chee-hwa) - 2005 (Tung Chee-hwa) - 2005/06 (Donald Tsang) - 2006/07 (Donald Tsang) - 2007/08 (Donald Tsang) - 2008/09 (Donald Tsang) - 2009/10 (Donald Tsang) - 2010/11 (Donald Tsang) - 2011/12 (Donald Tsang) - 2013 (Leung Chun-ying) - 2014 (Leung Chun-ying) - 2015 (Leung Chun-ying) - 2016 (Leung Chun-ying) - 2017 (Leung Chun-ying) - 2017 (Carrie Lam) - 2018 (Carrie Lam) - 2019 (Carrie Lam)
2.	Annual Reports of SPRING Singapore (later renamed as Enterprise Singapore) - 2005/06 - 2006/07 - 2007/08 - 2008/09 - 2009/10 - 2010/11 - 2011/12 - 2012/13 - 2013/14 - 2014/15 - 2015/16 - 2016/17 - 2017/18 - 2018/19 - 2019/20	Annual Reports of InvestHK - 2016 - 2017 - 2018 - 2019

Table A2. Details of Interviews in Singapore

	Singapore			
No.	**Interview code**	**Role in the entrepreneurial ecosystem**	**Current role/designation**	**Year first active in the ecosystem**
1	EA 1	Founder, mentor	Co-founder of tech startup	2013
2	EA 2	Founder, mentor	Co-founder of tech startup	2013
3	EA 3	Founder, mentor	Co-founder of tech startup	2012
4	ERP 1	Accelerator, former founder	Manager of accelerator	2019
5	ERP 2	Incubator, mentor	Director of Incubator	2019
6	ERP 3	Policymaker	Senior manager in government body	2017
7	ERP 4	Policymaker	Manager in government body	2015
8	ERP 5	Policymaker, investor	Assistant Director in government body	2017
9	ERP 6	Policymaker	Deputy Director in government body	2013
10	EC 1	Forrmer founder, mentor, investor	Venture capitalist	2015
11	EC 2	Matching service, Investor, Ex-policymaker, mentor	Matching service	2015
12	EC 3	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2011
13	EC 4	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2015
14	EC 5	Matching service, former founder, former manager at accelerator	Co-founder of matching service/Policymaker	2015

Table A3. Details of Interviews in Hong Kong

	Hong Kong			
No.	**Interview code**	**Role in the entrepreneurial ecosystem**	**Current role/designation**	**Year first active in the ecosystem**
1	EAH 1	Founder	Co-founder of tech startup	2018
2	EAH 2	Founder	Co-founder of tech startup	2019
3	EAH 3	Founder	Co-founder of tech startup	2015
4	EAH 4	Founder, mentor	Co-founder of tech startup	2017
5	EAH 5	Founder	Co-founder of tech startup	2016
6	EAH 6	Founder, ex-investor	Co-founder of tech startup	2017
7	ERPH 1	Policymaker	Assistant manager	2015
8	ERPH 2	Policymaker	Assistant Manager	2017
9	ERPH 3	Policymaker	Head of Team	2014
10	ERPH 4	Policymaker	Head of Centre	2007
11	ERPH 5	Policymaker	Senior Manager	2004
12	ERPH 6	Investor	Investment Manager	2015
13	ERPH 7	Incubator, matching service	Senior Manager of incubator	2015
14	ERPH 8	Incubator, matching service	Manager of incubator	2016
15	ERPH 9	Accelerator, ex-investor	Head of Centre	2011
16	ECH 1	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2014
17	ECH 2	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2019
18	ECH 3	Serial entrepreneur, founder	Co-founder of tech startup	2014
19	ECH 4	Matching service, incubator	Executive Director of Centre	2011
20	ECH 5	Former founder, mentor	Venture Builder	2013

Table A4. Illustrative quotes from interviews

Institutions	**Entrepreneurial ecosystem dynamic**	**Entrepreneurial ecosystem coordinative aspect**	**Illustrative quote (Singapore)**	**Illustrative quote (Hong Kong)**
Conducive	Blockbuster entrepreneurship	Entrepreneurial ecosystem actor	"[the government] is tasked with going out to meet startups out here [in Silicon Valley] and bring them back to Singapore. I think there are efforts from the public sector to create more startups, to build a space for startups in Singapore, maybe bring in some bigger names and people can learn from them so that we go beyond [startups like] Lazada and Shopee" (EC 5 Interview)	-
	Fluidity and diversity of entrepreneurs		"If there's a foreigner coming in, they can partner with a Singaporean to manage the startup and that also qualifies as a local startup for funding." (ERP 5 Interview)	"Hong Kong is still seen as one of the places that's much easier to get a visa than other places, especially if you've got the right talent, the skill set. Two weeks for the fast track visa issued in an industry that is in demand" (ERPH 3 interview)
Conducive	Ecosystem interactions	Entrepreneurial ecosystem connector	"the government will normally appoint multipliers, multipliers like	"we are working together with the Hong Kong Chamber of

			accelerators and incubators to grow the community because for the government alone, it is going to be too resource intensive. We appoint all these multipliers to the ecosystem, pull the network together, get them to organise events, demo days, pitch days, and all the school events and through multipliers, we get other people to help" (ERP 4 Interview)	Commerce, where we will conduct some business matching. If a local small and medium enterprise is looking for some digital transformation solution, we would do some business matching amongst our list of startups to see if they are providing such digital solutions that these enterprises can adopt" (ERPH 2 Interview)
Conducive	Spatial dynamics	Entrepreneurial ecosystem connector	"But for them to really break into international markets, not so easy, to be honest, and I would say for Singapore to really grow in terms of our next phase, I think the government has been trying, they have noticed it, in the past two years they started things like ESG has this scale up programme so that helps local companies to expand overseas. But you see then the issue now is that how many startups actually when they reach a	"We basically support overseas companies to establish here, and we've got eight different sector teams dedicated to very specific industries, and we've got about 30 offices around the world for people who are just looking for initial information in Hong Kong and a specific sector" (ERPH 2 Interview).

			certain" (EC 2 Interview)	
Conducive	Government adopting the role as a key resource provider	Entrepreneurial resource provider	"One way of government support is seed funding, you can easily get up to $50,000 support in grants and that's good. You don't see that in most other countries" (EA 2 Interview) "If we were to chart it out, government investment entities, seeds capital and SG Innovate tend to do the early-stage funding like pre-seed, seed, series A, and for series B then we have EDBI and then further down the line, we have Temasek and GIC" (ERP 5 Interview)	"I myself attend many acceleration programs in ASEAN. And when you talk to the policymakers in those regions, none of them have that kind of cash— cash injection from the government or even if they do, tjeu would get quite a lot of equity out of it. So I would say Hong Kong in terms of the government funding, it's actually quite abundant" (EAH 1 Interview)
Regulative	Nature and availability of funding	Entrepreneurial resource provider	"we have come up with a unique position for VCs to anchor here" (ERP 3 Interview)	"the tax regulation in Hong Kong is more simple and easier to manage" (EAH 6 Interview)
Normative	Desirability of entrepreneurship and startups	Entrepreneurial orientation	"I think recently in the past few years, there's been more and more startup news, people are starting to know about startups. They are starting to hear about the successful startup	-

			stories and so people are starting to become more open to the idea of startups, working for startups" (EC 2 Interview)	
Normative	Prioritisation of technology and innovation	Entrepreneurial orientation	-	"We need to educate the stakeholders to understand what technology can help them with, it is not replacing their career and their jobs and it is not conflicting with them. Sometimes they will have this kind of misunderstanding. For example, a lot of people have been sharing information on how A.I. in the future will replace all the manual jobs" (ERPH 4 Interview)
Cognitive	Entrepreneurial mindset and skillset	Entrepreneurial orientation	"The NUS Overseas College lets amateurs get an idea of what entrepreneurship is, which is why I think it's important" (EC 2 Interview)	"In universities, what we've been doing is to encourage students, or to educate them to have the capability, to realise the ideas and make things happen, which is not a common education in the past" (ERPH 7 Interview)

				“I think it's not since last couple of years that this whole entrepreneurial vibe started to come out. I wouldn’t say the government has no contribution towards that” (ECH 5 Interview)

CHAPTER FOUR

The role of culture in entrepreneurial ecosystems: A Bourdieuian perspective

Abstract: The culture of an entrepreneurial ecosystem affects the level of entrepreneurial activity produced and the creation of policies affecting entrepreneurship culture has been a common policy response. This paper examines cultural change in Singapore's entrepreneurial ecosystem to illustrate exactly how culture affects entrepreneurship uptake and suggests that it can be analysed in terms of Bourdieu's concepts of field, capital, and habitus. Using data from qualitative interviews with the key stakeholders in Singapore's entrepreneurial ecosystem, the paper finds that culture in the entrepreneurial ecosystem can be understood in terms of cultural capital: entrepreneurial experiences, entrepreneurial spaces, media, and entrepreneurial education. Respectively, the different types of cultural capital affect the individual's disposition towards entrepreneurial activity in three main ways: entrepreneurial identity, societal norms and values, and entrepreneurial capabilities. With this understanding of what culture constitutes and how it affects entrepreneurship, this paper offers important theoretical and policy implications.

Keywords: Bourdieu, Culture, Cultural capital, Entrepreneurial ecosystem

4. Introduction

Innovative entrepreneurship is regarded as a key driver of economic development (Acs et al., 2008; Block et al., 2017; Giraudo et al., 2019). Innovative entrepreneurship has become an important policy aim in many nations, often linked with the Schumpeterian entrepreneur who drives creative destruction (Schumpeter, 1934) and commercialises a new idea into a product or service (Acs et al., 2009). Governments throughout the world are increasingly turning to the entrepreneurial ecosystem concept as a policy approach to support creative entrepreneurship (Isenberg, 2011; Brown and Mason, 2017). One of the most widely accepted definition of an entrepreneurial ecosystem is from Stam, who defines it as "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam, 2015, p.1765),.

Early research on the entrepreneurial ecosystem concept has focused on studying the elements within the ecosystem, with culture being a key feature across most frameworks (Brown and Mason, 2017; Isenberg, 2011; Spigel, 2017b). Brown and Mason (2017) conceptualised entrepreneurial ecosystem as having four key coordinative aspects, with entrepreneurial culture being one. Isenberg (2011) argues that there are six key components of an entrepreneurial ecosystem, including markets, policy, human capital, finance, culture and supports. Spigel (2017b) categorised the entrepreneurial ecosystem into three main attributes: material, social, and cultural attributes. Yet, culture remains under-theorised within the entrepreneurial ecosystems literature and several research gaps exist. First, despite culture being listed as a key attribute of the entrepreneurial ecosystem, it is unclear as to how culture evolves or how it can be strengthened over time. Moreover, studies on entrepreneurial culture often present a tautological problem due to a lack of a clearly defined cause-effect framework. For example, studies often measure the culture of an entrepreneurial ecosystem by using the number of new firms being set up (Stam and van de Ven, 2021). Entrepreneurial ecosystems are currently thought of as systems which creates productive entrepreneurship, yet the attributes of the entrepreneurial ecosystems are conceptualised from successful entrepreneurial ecosystems (Nicotra et al., 2018).

Thus, more work can be done to clarify how culture as an attribute leads to innovative entrepreneurship (Stam, 2015), addressing the tautological problem the framework currently presents (Alvedalen and Boschma, 2017). On this basis, we focus the investigation on culture as an element within the entrepreneurial ecosystem and its effect on entrepreneurship by answering the following research question: How has the culture of the entrepreneurial ecosystem in Singapore changed from the early 2000s to 2020 and how has it led to new startup creation?

The paper chose to study Singapore's entrepreneurial ecosystem as it is one of the world's fastest growing startup ecosystem, evident from its evolution in the last two decades. Since its first national innovative entrepreneurship policy known as the Technopreneurship 21 (T21) in 1999, Singapore has seen a rapid increase in innovative entrepreneurial activity. In 2019, the Singaporean startup ecosystem had a start-up valuation at about US$25 billion, surpassing the global average by at least five times (Startup Genome, 2019). Singapore has also produced 10 unicorns (start-ups valued at more than $1 billion), such as Grab, PatSnap and Lazada. This is in comparison to the 1990s where Singapore lagged behind in terms of overall entrepreneurial activity compared to the other newly industrialised East Asian economies. Then Senior Minister Lee Kuan Yew in 1993 even remarked that if Singapore do not produce enough entrepreneurs like its competitors, Taiwan, South Korea and Hong Kong, Singapore might become a failed economy in the next decade or two (The Straits Times, 1993). In 2000, the Global Entrepreneurship Monitor (GEM) reported that only 2.1% of Singapore's adult population aged between 18 to 64 were involved in entrepreneurial activity in the last 18 months (Wong et al., 2001). Despite this success, studying Singapore as a case remains limited in the entrepreneurial ecosystem literature.

This paper makes a threefold contribution to the field. First, it contributes to existing knowledge by theorising culture within the entrepreneurial ecosystems via incorporating insights from Bourdieu's practice theory: field, capital, and habitus (Bourdieu, 1986; 1998). Second, it contributes to theory by theorising the causal-effect relationship between the entrepreneurial ecosystem and entrepreneurship. Through investigating cultural change over time, this study helps us to understand how entrepreneurial ecosystems develop in the context of cultural changes and produces entrepreneurial activity. With this understanding of the critical role culture plays in the entrepreneurial ecosystems, policymakers can better formulate policies to promote entrepreneurship effectively (Brown and Mawson, 2019). Third, it adds on to existing empirical material on entrepreneurial ecosystems which is currently focused on Western case studies by examining a key entrepreneurial ecosystem in Asia (Chen et al., 2020).

The paper proceeds as follows: In Section 4.1, the theoretical framework is discussed and in section 4.2 the method is presented. The background of Singapore is outlined in Section 4.3. In Section 4.4 the types of cultural capital and how cultural capital in the entrepreneurial ecosystem promotes entrepreneurship is discussed. Section 4.5 summarises and concludes the paper.

4.1 Theory

4.1.1 Entrepreneurial ecosystem as a field

Research on entrepreneurial ecosystems offer us valuable information to understand how and why entrepreneurial activity flourishes in some countries and not others. Responding to the calls of paying more attention to the contextual conditions, the entrepreneurial ecosystem concept emerged as an approach to study entrepreneurship via a systemic perspective. The entrepreneurial ecosystem concept has three distinct features: first, it focuses on the role of contextual environment in enabling or inhibiting entrepreneurship (Welter, 2011). Second, entrepreneurs constitute the main focus as opposed to the firm (Stam, 2015). Third, the entrepreneur is not just a passive receiver in the ecosystem but is also a core actor in maintaining and developing the ecosystem (Spigel and Harrison, 2018). On this basis, this paper uses the notion of field (Bourdieu, 2005) to study the entrepreneurial ecosystem.

Bourdieu describes a field as a defined social space made up of networks or relations between actors (Bourdieu and Wacquant, 1992). The field is seen as a social arena where interactions take place between agents and these agents behave in accordance with the "rules of the game" (Bourdieu and Wacquant, 1992, p.97). In essence, the field is seen as a context for actors to maneuver and struggle for resources (Wallace and Wolf, 1999). While Bourdieu's concept of field has been most frequently used in studying education, recent works have also applied this concept on entrepreneurship (Spigel, 2013). For example, De Clercq and Voronox (2009) uses the "field" concept to study business industries in which entrepreneurs enter. McAdam et al., (2019) studied the entrepreneurial ecosystem as a field and adopted a gender capital perspective to study the role of women's entrepreneurial networks in fostering women's participation in the ecosystem.

Closely related to the concept of "field" is capital and habitus in Bourdieu's practice theory (Bourdieu, 1986). According to Bourdieu (1977, p.178), capital refers to "all the goods, material and symbolic, without distinction, that present themselves as rare and worthy of being sought after in a particular social formation". There are four types of capital: economic, social, cultural, and symbolic, and together they constitute all "the inherited assets which define the possibilities inherent in the field" (Bourdieu, 1993, p.150) affects the success of the actors concerned. In this regard, capital within the entrepreneurial ecosystem can be said to affect the level of entrepreneurship produced. Capital is said to affect the habitus, which refers to a system of "durable, transposable dispositions" of the individual in relation to action in the field (Bourdieu, 1977, p.72). The habitus "which, in imposing different definitions of the impossible, the possible, and the probable, cause one group to experience as natural or reasonable practices or aspirations which another group finds unthinkable or scandalous" (Bourdieu, 1977, p.78). In essence, habitus

which is regarded as "the internalisation of social expectations and value systems" (Kelly and Lusis, 2006, p.834) enables individuals to act and behave without intentionally doing so (Bourdieu, 1990).

Taken together, this paper studies the role of culture within an entrepreneurial ecosystem by focusing on cultural change over time. In particular, by understanding how the act of undertaking entrepreneurship is a result of cultural capital which affected individuals' habitus, in terms of "their dispositions of how 'to be and to do' (how to think and how to act) as entrepreneurs" (McAdam et al., 2019, p.461). This will be analysed in relation to the different types of cultural capital that individuals can acquire within the entrepreneurial ecosystem. While Bourdieu (1986) discusses four types of capital, this article focuses only on cultural capital as the aim is to study cultural change within the entrepreneurial ecosystem. There are three main types of cultural capital: embodied (eg. past experiences), objectified (eg. machine, books), and institutionalised (eg. educational qualifications) (Bourdieu, 1986).

4.1.2 Culture in entrepreneurial ecosystem and cultural capital

Early research on entrepreneurial ecosystems has often delineated culture as a key element of successful ecosystems (Feld, 2012; Isenberg, 2011; Spigel, 2017b). This typically includes a list of positive cultural traits for entrepreneurship, such as tolerance for risk-taking, acceptance of failure, and high social status of entrepreneurs (Mason and Brown, 2014; Feld, 2012). A societal culture with a negative perception towards entrepreneurship is said to deter entrepreneurial activity (Isenberg, 2011) while a positive culture can affect social capital and knowledge capital accumulation, in turn contributing to new startup creation (Nicotra et al., 2018). Research on entrepreneurship have used cultural capital as a framework to study how culture affects entrepreneurs. Jayawarna et al. (2014) defined cultural capital as family socioeconomic status and whether parents were in business and argued that cultural capital was crucial in predicting an individual's entrepreneurial propensity. Likewise, Kim et al., (2006) investigated the effects of cultural capital on entrepreneurial entry by using parents' business owner as an indicator for cultural capital. Relatedly, most works tend to operationalise cultural capital as family-related factors and have yet to fully explore the relationships between capital, the field, and habitus (Bourdieu, 1990) and how they contribute to entrepreneurship. Moreover, such works often do not explore cultural capital in the context of the entrepreneurial ecosystem.

Recent works have begun to incorporate the ideas of field and habitus alongside cultural capital when studying entrepreneurship. Using a Bourdieuian approach, Spigel compared the

entrepreneurial ecosystems (fields) in Ottawa and Waterloo and argued that cultural outlooks, defined as "the way in which actors understand the world around them", was a key explanation to their differences in the level and dynamics of entrepreneurship mentoring (Spigel, 2017a, p.287). Terjesen and Elam (2009) studied how entrepreneurs decide to internationalise because of their worldviews (habitus) and resources available (capital). Adopting an ecosystem service framework, Donaldson (2021) studied cultural infrastructure in the form of entrepreneurial spaces and entrepreneurial practices and argued that these infrastructures were critical in generating ecosystem benefits such as entrepreneurial identity and entrepreneurial experiences. Building on these studies (Spigel, 2017a; Donaldson, 2021), this paper draws on Bourdieu's (1977) concept of field, cultural capital, and habitus to guide this study on investigating cultural change in an entrepreneurial ecosystem and how it leads to a growth in innovative entrepreneurship.

4.2 Method

4.2.1 Case description

With around 5.7 million residents and a Gross Domestic Product (GDP) of 372.1 billion USD (World Bank, 2019), Singapore is a global financial and economic hub situated in Southeast Asia. Like other East Asian economies, Singapore has shifted its economy from one that is focused on manufacturing and industrialisation to a modern service and knowledge-based economy over the years. Additionally, Singapore has built up a remarkable reputation as a research hub as well as a science and technology hub.

Singapore makes a typical case (Seawright and Gerring, 2008) to study as the East Asian city-state has experienced a significant transformation in its entrepreneurial landscape (Motoyama and Watkins, 2014). Singapore first implemented the T21 initiative in 1999 in a bid to promote innovation and move towards a knowledge-based economy (Foo and Foo, 2000; Wong, 2001). In a span of less than two decades, Singapore has managed to transform itself from a city-state with low entrepreneurial activity to a start-up hub that is bustling with high tech entrepreneurship. Moreover, since Singapore became independent in 1965, the country has averaged an annual growth of 8% and its economy is consistently ranked in the top 10 globally in the Global Competitiveness Report (Koh and Phan, 2015). Singapore's development strategy and its growth over the past 5 decades constitute a remarkable story. Moreover, our understanding of these entrepreneurial ecosystems outside the West remains limited even though entrepreneurial activity and venture capital have expanded in Asia. Studying Singapore as a case can provide further insights into the rise of Asian entrepreneurial ecosystems. While this empirical study is not

representative of all entrepreneurial ecosystems in Asia, the perceptions and experiences of the key actors in the entrepreneurial ecosystem offer valuable insights into how culture can evolve in an ecosystem (Doern, 2009; Hindle, 2004). At the same time, this study not only offers more insights into understanding the Singaporean case but also offers potential analytic generalisations.

In particular, the study analyses the changes in cultural capital in Singapore over time alongside the development of the national entrepreneurial ecosystem. The starting point for the analysis of the evolution of the entrepreneurial ecosystem is 1999. This is justified as this is the period where some of the very first government policies were initiated to promote high tech entrepreneurship. In the 1990s, the Singapore government sought to shift its economy towards a knowledge-based economy focused on innovation away from its existing structure which was predominantly capital and skills-intensive, with a focus on the manufacturing industry (Koh and Koh, 2002). In the 1990s, the government began to focus on developing the country's science and technology capabilities, evident from the first 5-year R&D plan started in 1991 which was termed Science and Technology plan. In 1999, the Singapore government also launched its first dedicated all-encompassing initiative to promote technology entrepreneurship known as the T21 initiative.

4.2.2 Empirical material collection and analysis

A qualitative methodology with semi-structured interviews is chosen as the main method (Yin, 2003; Eisenhardt and Graebner, 2007). Such a methodology is suitable to study the development of the entrepreneurial ecosystem in Singapore as the entrepreneurial ecosystem is "a complex social phenomenon…characterised by complex, dynamic and emergent processes" (Karatas-Ozkan et al., 2014, p. 590).

The paper addresses the main research question by first, studying the cultural changes that occurred in Singapore's entrepreneurial ecosystem in terms of the three types of cultural capital. Secondly, the paper focuses on how cultural capital affected the individual's disposition towards entrepreneurial activity, leading to an increase in innovative entrepreneurship. The main empirical material of this study consists of 14 semi-structured interviews conducted in Singapore during the summer of 2020 (Table 1). In line with studies that see the entrepreneurial ecosystem as industry-agnostic (Mack and Mayer, 2016), the recruitment of interview participants was not restricted to any particular sector. Following Brown and Mason (2017)'s classification of three types of key stakeholders in the entrepreneurial ecosystem, participants were selected as long as they were based in Singapore and constituted as either (i) an entrepreneurial actor (eg. founder, role model), (ii) entrepreneurial resource provider (eg. accelerator, investor, policymaker) or (iii)

entrepreneurial connector (eg. former founders, serial entrepreneurs). Triangulation is achieved by considering the perspectives of different actors in the entrepreneurial ecosystem (Patton, 1990). A detailed list of interviewee participants in provided in the Appendix (Table A1).

Table 1. Description of key interviewees

Type	**Number in Singapore**
Entrepreneurial actor eg. founder, role models	6
Entrepreneurial resource provider eg. accelerator, incubator, investor, policymaker	9
Entrepreneurial connector eg. former founders, serial entrepreneur, matching services	6

Note: Some interviewees fall into more than one type (eg. some investors used to be entrepreneurs)

The interviewees were first identified through the researcher's personal connections and scouring through LinkedIn. The snowballing technique was then used to further identify other potential interviewees (Patton, 1990). To minimise the risk of sampling bias due to the resultant sample being not random and incomplete, this study sources for potential interviewees by searching on LinkedIn as well as obtaining referrals for the interviews through a variety of mutually independent sources. At the same time, the backgrounds of the interviewees are well distributed among the different stakeholders in the entrepreneurial ecosystem, thus reducing the risk that the findings may be skewed towards a certain perspective resulting from one actor group.

Following Mack and Mayer (2016), these interviews aimed to get a general perspective on the Singaporean entrepreneurial ecosystem instead of a specific industry or a particular group of firms. The duration of the interviews ranged from between 30 minutes to 1 hour and 30 minutes. The interviews were conducted on Zoom and recorded with the interviewee's consent and later transcribed before coding. All interviews were conducted in English. The semi-structured interviews, combined with the GEM 2000: Singapore Report and annual reports of the Standards, Productivity, and Innovation Board (SPRING) Singapore constitute the basis for my findings on

cultural change in Singapore's entrepreneurial ecosystem and how it affected innovative entrepreneurship.

The data was analysed thematically on the Nvivo software (Bryman, 2016) and a three-step coding approach was used (Elliott, 2018). First, each paragraph was coded whereby descriptive codes were assigned to the text, such as "sharing sessions" or "success stories". Second, the codes were further categorised into themes that arise from the emerging associations between the description codes and analytical reflections led by the research questions. Examples included "entrepreneurial spaces" and "entrepreneurial experiences". Lastly, the themes were further combined into aggregate dimensions (Gioia et al., 2013) that focused on entrepreneurial identity, societal norms, and entrepreneurial capabilities.

The study also carried out steps to ensure the reliability and validity of the data analysis process, such as coding reliability. To ensure coding accuracy, I carried out the following two steps. First, I developed clear coding guidelines (Strauss and Corbin, 1990). I defined the coding unit as a part of the interviews which conveyed a particular idea or theme. Second, I conducted an intercoder reliability test (Miles and Huberman, 1994) where I invited another colleague – a PhD researcher with experience in analysing qualitative data, to independently code a segment of my interview transcripts. Intercoder reliability refers to "a measure of agreement between multiple coders about how they apply codes to the data" (Kurasaki, 2000, p.179). The agreement of the codes between the coders indicates that the themes resulting from the data are not simply the researcher's imagination but constitute a shared constructs (Kurasaki, 2000; Ryan, 1999). Such agreement between coders help to support the validity of the data analysis (Mitchell, 1979). The second coder was informed of the research objectives, methodology and the coding guidelines. Following O'Connor and Joffe's (2020) guideline of using 10% to 25% of the total number of interviews to measure intercoder reliability, my second coder independently coded two (14%) out of the 14 interview transcripts. The two interview transcripts were chosen randomly from the pile of 14 transcripts.

Once the coding was completed by the second coder, I assessed the inter-coder agreement based on percentage agreement. The percentage agreement can be calculated by dividing the total number of agreed codes by the total numbers of codes created. The percentage agreement between my second coder and I was calculated to be 82%. According to Miles and Huberman (1994), a percentage agreement of at least 80% on 95% of the codes is acceptable for conducting qualitative coding analysis. I was also able to discuss and resolve any disagreements with the second coder in terms of the codes created.

Second, as the sole researcher for this study, I was also cognizant of the fact that my role in data collection can affect the reliability and validity of the data analysis process. There is the potential of interview bias (Kvale and Brinkmann, 2009) due to the case chosen being a country where I grew up in as well as the personal ties between some of the interview participants and myself. The personal relationships might unintendedly influence the responses of the participants and result in skewed answers. Participants may give socially desirable answers due to the personal relationship with the researcher.

To reduce interviewer bias, I carried out a few strategies both pre-interview and during the interview process. Before the interviews were carried out, I undertook training related to conducting interviews to carry out interviews efficiently with minimal bias. At the same time, a rough interview guide was developed with four main standardised questions to minimise variations across the interviews (Kvale and Brinkmann, 2009). During the interview process, I first build up rapport with the interview participants (Galleta, 2013) by introducing myself as PhD researcher investigating the development of Singapore's entrepreneurial ecosystem. I made it a point to downplay my identity as an expert in entrepreneurial ecosystem so as to avoid any potential power dynamics that might arise. I also assured the interview participants that there were no wrong answers and that every opinion on the issue at hand was a valid one (Kvale and Brinkmann, 2009). This helped create a safe and respectful environment for the participants and they were able to express their opinions freely and openly (Galleta, 2013). Moreover, I was also conscious of the interview bias throughout the research process and avoided expressing personal opinions, especially during the interviews with participants recruited via personal connections, in order to remain neutral and objective. Lastly, the interviews were also documented through audio recordings (Bryman, 2016). The audio recordings were listened to at least three times during the transcribing process and the final transcripts were also read against the audio recordings to verify the accuracy of the content.

4.2.3 Potential limitations

There are several potential limitations in terms of conducting semi-structured interviews in this study. The first potential limitation concerns the risk of sampling bias due to the non-random and incomplete sampling method. As suggested by (Patton, 2002), sampling bias may cause the sample size to be unrepresentative of the larger population. This a common limitation for conducting semi-structured interviews, as detailed in Kvale and Brinkmann (2009). Overall, while it may limit the potential to generalise to a wider population, the purposive sampling allowed me

to obtain an in-depth understanding of the phenomenon at hand, which is the cultural change of Singapore's entrepreneurial ecosystem (Patton, 2002).

To address sampling bias in this study, this study adopted the following three steps to carry out the sampling process. First, I defined the target population and research objectives clearly (Kvale and Brinkmann, 2009). The target population is the different stakeholders within Singapore's entrepreneurial ecosystem who are familiar with how the ecosystem has developed. The research objective is to examine cultural change in Singapore's entrepreneurial ecosystem and its role on the development of the ecosystem.

This was followed by adopting purpose sampling to recruit the participants for the semi-structured interviews (Marshall, 1996). In terms of purposive sampling, the study selected participants based on fulfilling two criteria pertinent to the research objective: (i) based in Singapore, and (ii) having a role in the entrepreneurial ecosystem as either an entrepreneurial actor (eg. founder, role model) or entrepreneurial resource provider (eg. accelerator, investor, policymaker) or (iii) entrepreneurial connector (eg. former founders, serial entrepreneurs). As the research was focused on investigating how the entrepreneurial ecosystem's culture developed, these two criteria allowed me to interview the right participants who possessed the crucial knowledge on Singapore's entrepreneurial ecosystem due to their experiences and involvement within the ecosystem. I made sure to have an even distribution of interview participants across the three different types of stakeholders (entrepreneurial actor, entrepreneurial resource provider, and entrepreneurial connector) in the entrepreneurial ecosystem (refer to Table 1). The study used convenience and snowball sampling to recruit the participants for the semi-structured interviews, as it was difficult to reach out to key stakeholders of the entrepreneurial ecosystem such as entrepreneurship policymakers and entrepreneurs. Based on the criteria listed, the participants were first identified both on LinkedIn and through the researcher's personal contacts. After conducting the interviews, the participants were also asked to refer other potential candidates for the interviews.

Last, the sampling process is documented carefully with each participant being selected because of the criteria they fulfil. Table A1 in the Appendix details their specific role and their year of involvement within the Singapore's entrepreneurial ecosystem. An interview code was assigned to each participant depending on the roles they occupy. The code "EA" was assigned to an entrepreneurial actor (eg. founder, role model), the code "ERP" to an entrepreneurial resource provider (eg. accelerator, investor, policymaker) and the code "EC" to an entrepreneurial connector (eg. former founders, serial entrepreneurs). There were some participants who occupied

dual roles, and this were also noted during the interviews. Overall, the study aimed to obtain at least six interviews from each category of stakeholder given that theoretical saturation can be achieved with just six interviews (Guest et al., 2006).

The second limitation is the potential influence of the researcher's connections on the selection of the interview participants. Due to the researcher's personal connections, the pool of interview participants in this study might be more willing to participate in the interviews, resulting in self-selection bias. The participants from the researcher's personal connections may have specific experiences or views about Singapore's entrepreneurial ecosystem from those outside of the researcher's personal connections. Self-selection bias can cause a lack of diversity and unrepresentativeness in the sample. To minimise self-selection bias resulting from the personal connections of the researcher, this study also recruited participants from LinkedIn which were not known to the researcher. The researcher scrolled through major entrepreneurship posts on LinkedIn related to Singapore and identified potential participants for the semi-structured interviews. Such a recruitment process combining both participants from the researcher's personal connections and from the LinkedIn website reduced the self-selection bias. Moreover, I also followed up on non-responders on LinkedIn by sending them a follow-up message to invite them to participate in the interviews. In the final sample of 14 interviews, five were recruited from the researcher's personal connections.

4.3 Background of Singapore

The culture within the entrepreneurial ecosystem in the early-2000s were largely inconducive for entrepreneurship. There were considerable cultural and social norms that hindered Singaporeans from pursuing entrepreneurship. These included the fear of failure, the preference of working for big and established companies, a lack of entrepreneurial mindset, and a disdain towards entrepreneurship as a career (Wong et al., 2001, p.4).

Firstly, there is a strong fear of failure and risk-averse mentality amongst many Singaporeans. Failure is not well-accepted in Singapore and is often not taken in stride by many. Unlike Western countries such as the United States, where failing is seen in a positive light as the individual will "now know what to do and what to avoid" (Low, 2006), failure in Singapore is often associated with embarrassment. The potential loss of "face" from a failed venture further prevents Singaporeans from engaging in entrepreneurship (Begley and Tan, 2001). This is perhaps due to the majority race of Singapore's population where over 75% of the citizens are ethnically Chinese. As Hwang (1987) suggest, having "face" is a crucial part of Chinese culture and this

prevents the Chinese from undertaking any activity that may potentially result in a loss of "face". Risk taking is often avoided in Singapore (Kawasaki, 2004; Low, 2006) where its citizens are often described as *kiasu* (a Singlish term for afraid of losing out) and *kiasi* (a Singlish term for afraid to "die"/overly timid). Moreover, due to the relatively high salaries and the security of stable income from working in a big company, there were little financial incentives for Singaporeans to seek out entrepreneurial careers (Low, 2006). In this context, there was no need to "rock the boat" and pursue entrepreneurship as a career, a path that is not "tried and tested" in Singapore.

Secondly, there is a lack of creative thinking and entrepreneurial mindsets amongst many Singaporeans due to the "rote learning" nature of the national education system. In the past, the Singaporean education system has a heavy emphasis on learning facts and accumulating technical competencies and students are not necessarily trained to be "creative". The emphasis on "getting the correct answers" hindered the development of creativity amongst Singaporeans. In a focus group session conducted by Low (2006), 85% of the participants expressed similar sentiments on the country's education system and stated that Singaporeans "are not street-smart" and "are too left-brained and textbook-oriented". The education system in Singapore seems to neglect on nurturing students' ability to think independently, resulting in a lack of creativity, a trait essential for entrepreneurship (ibid).

Lastly, there is generally a negative attitude towards entrepreneurs and entrepreneurship as a career. In the survey conducted by Wong et al. (2001), only 50.3% of the respondents stated that they respected people who started a business. This contrasts with the median value of 83% for all 21 countries that took part in the GEM annual survey in 2000. Additionally, 21.1% of the respondents even indicated that they resented successful entrepreneurs, which further highlight the negative atmosphere towards entrepreneurs within Singapore's society.

4.4 Findings

The findings have been structured into three main sub-sections. First, a brief overview of the current entrepreneurial ecosystem is provided. Second, the main themes generated from the coding is presented under the three main types of cultural capital. Last, how cultural capital affected the individual's disposition (habitus) towards entrepreneurship is presented. Direct quotes from the interviews are provided to highlight the specific findings (Marshall and Rossman, 1995).

4.4.1 Entrepreneurial ecosystem

Interviews with the different stakeholders of the entrepreneurial ecosystem conducted in May and June 2021 reveal that progress has been made in the growth of the Singapore's entrepreneurial ecosystem. Majority of interviewees noted remarked that Singapore had experienced significant changes in the level of entrepreneurial activity in the last five to eight years (EA 1 Interview; EC 5 Interview; ERP 2 Interview; ERP 6 Interview). As one interviewee puts it, "I think this year especially, you see a lot of the local startups raising Series B and above funding so that is really good. I also saw a lot of local homegrown investors raising funds or closing their round" (ERP 6 Interview). The entrepreneurial ecosystem appears to be maturing, with the both the amount of resources as well as the flow of resources across the different actors increasing. The following sections discuss the three types of cultural capital found in Singapore's entrepreneurial ecosystem and how it has contributed to an increase in entrepreneurship via affecting the individual's disposition (habitus).

4.4.2 Cultural capital

i) Embodied cultural capital

The main type of embodied cultural capital we found from the data is entrepreneurial experiences. Entrepreneurial experiences include working for a startup and interacting with entrepreneurs. First, there is evidence of entrepreneurship work experiences before founders establish their own startups. The interviews revealed that entrepreneurs typically work at other startups or larger corporations to gain experience before founding their own startup (EA 1 Interview; EA 2 Interview). Startup founders first gain experience and try out entrepreneurship careers via internships or working in a tech company. Second, entrepreneurs are also giving talks and attending sharing sessions with students to create more awareness about founding a startup as a career and the challenges associated with it (ERP 3 Interview; ERP 5 Interview). An interviewee who run venture building programmes in universities remarked that "Once in a while, I'll reach out to these entrepreneurs to ask them to give talks about their journey and to share their story. Most of them are very open to sharing their stories" (EC 2 Interview). Stories of entrepreneurs sharing their entrepreneurial career trajectories show up frequently in the interviews. While some entrepreneurs share their experiences at high schools and universities, there are also others who do so on various social media platforms such as LinkedIn and online webinars (ERP 3 Interview).

Third, there is also the presence of sharing sessions and mentorship where experienced entrepreneurs guide potential founders or younger entrepreneurs in the startup process (EA 1

Interview; EC 1 Interview; EC 5 Interview). As one interviewee suggested: "There is a lot of that sharing and it's generally quite free as to what the pain points that we faced when we went down this road or what you should be aware of when you approach an investor or things like that" (ERP 5 Interview). It appears that most senior entrepreneurs are willing to share their personal experiences with the younger entrepreneurs and serve as mentors to them, which can serve as crucial guidance and support for new founders wishing to venture into the startup scene.

ii) Objectified cultural capital

Two forms of objectified cultural capital are found from the data: entrepreneurial spaces and media. In terms of entrepreneurial spaces, there is the Jurong Town Corporation (JTC) Launchpad, which is a huge development initiated by the government to house accelerators, incubators, tech startups and venture capitalists in the same location. Interviewees highlighted the JTC launchpad as a key infrastructure when discussing about the features of Singapore's entrepreneurial ecosystem (EC 4 Interview; EA 3 Interview). One interviewee noted that "Singapore dedicates a lot of space and the JTC Launchpad at One North is huge" (EC 4 Interview) whereas another noted that "We have used JTC launch pad in one north as a blueprint and I believe now they're building one in Punggol and another one in the Jurong Innovation district" (EA 3 Interview). This highlights the extent of entrepreneurial spaces in Singapore and how it is prioritised as a key government policy too. Entrepreneurial spaces provide a physical location for entrepreneurs to come together and learn from each other as well as participate in entrepreneurship experiences.

Secondly, there is also a strong presence of media coverage on entrepreneurship. The interviewees repeatedly remarked that there is an increasing media coverage of successful local entrepreneurs in the last five years, which helps to increase Singaporeans' awareness on the startup scene (ERP 6 Interview; EA 1 Interview; EC 2 Interview; EC 5 Interview). One interviewee mentioned about the frequent media coverage on successful entrepreneurs: "There are a few local champions that have started and then the government will use them as the poster boy or poster girl to encourage awareness and promote publicity for this sector" (ERP 2 Interview). Other interviewees also noted on the frequent publicity of success stories of Singaporean entrepreneurs, with some even remarking that it was almost akin to "over glorification" of entrepreneurs (EC 3 Interview; EA 2 Interview).

iii) Institutionalised cultural capital

The main type of institutionalised cultural capital found from the data is entrepreneurial education. Singaporean students are increasingly exposed to entrepreneurship through the education system. One key programme that featured in the interviews is the entrepreneurship programmes offered by the different local universities. These entrepreneurship programmes have helped to expose students to entrepreneurship via different mediums such as sharing sessions by successful mentors, overseas internships and business pitching sessions (EC 4 Interview; ERP 3 Interview; ERP 6 Interview). For example, the Action Community for Entrepreneurship (ACE) led by the government regularly invites entrepreneurs and established business professionals to give talks and share their experiences in schools (SPRING Annual Report, 2012).

Another key programme that most interviewees highlighted is the National University of Singapore Overseas College (NOC) programme offered by the National University of Singapore (NUS) (EA 3 Interview; EC 5 Interview). The NOC programme allows students to spend one or two semesters abroad overseas at the partner universities while undertaking an internship at a startup simultaneously. The locations of the NOC programme are all situated in areas with thriving entrepreneurship such as Silicon Valley, Tel Aviv, and Shanghai. Aside from entrepreneurship programmes at the universities, the government has also tried to promote entrepreneurship at the pre-university level, targeting students at a younger age (ERP 6 Interview). One example is the Young Entrepreneurs for Schools (YES Schools) initiative implemented in 2008. The YES Schools initiative provides grants of up to $100,000 to schools to develop a structured, hands-on entrepreneurship learning programme for their students. According to the interviewee (ERP 6 Interview), as part of this initiative, more and more schools have some form of entrepreneurship element in their curriculum today as compared to the past.

4.4.3 Role of Cultural Capital on Entrepreneurship

The results reveal that the three types of cultural capital (embodied, objectified, institutionalised) within Singapore's entrepreneurial ecosystem has contributed to the increase in entrepreneurship in three main ways: entrepreneurial identity, societal norms and values, and entrepreneurial capabilities.

i) Entrepreneurial identity

Embodied cultural capital can help to foster entrepreneurial identity within the society, encouraging entrepreneurs to pursue entrepreneurship as a career. Through entrepreneurship work experiences such as internships at a startup and sharing sessions with startup founders, individuals

are exposed to what being an entrepreneur means. In terms of work experiences at a startup, individuals get to know more about what founding startups entail as a career and by working in close proximity to entrepreneurs, they are able to gauge what being an entrepreneur means and how they should act. As several interviewees noted, these overseas internships at thriving entrepreneurial hubs allowed the students to experience first-hand what being an entrepreneur entails and how the entrepreneurship process works as well as gaining essential skillset needed for an entrepreneurial career (ERP 3 Interview; ERP 6 Interview; EA 3 Interview). One interviewee noted the opportunities such internship experiences presented (EC 2 Interview): "They are being exposed to the environment, not just about being overseas, but exposed to the overseas startup environment. They see the potential and because they see the possibility of what success could look like if they are willing to take the risk." University programmes such as the overseas startup internships allow the students to be engaged in entrepreneurial practices and experiences, such as pitching to an investor, and this helps to develop their own entrepreneurial self-efficacy where they can apply this knowledge to future endeavours. These experiences also provide real life encounters of "a founder's life", and they can offer meaning to individuals' understanding of what it means to be an entrepreneur.

Sharing sessions with experienced entrepreneurs also help to strengthen an individual's entrepreneurial identity. For example, one entrepreneur (EA 3 Interview) noted that "I got a lot from meeting other entrepreneurs, learning from the tech conferences, seeing what is actually happening out there." These sharing sessions can help foster a sense of entrepreneurial identity where individuals socialise with senior entrepreneurs and observe them as role models. Sharing sessions which often include personal experiences and challenges that an entrepreneur may face can help individuals understand more about founding a startup and learn more about how an entrepreneur should behave. At the same time, support is also provided from senior entrepreneurs and the sharing of knowledge can help individuals gauge whether they are a good fit for such a career. Such sharing sessions from senior entrepreneurs can also inspire individuals. For example, several interviewees noted that sharing sessions done by successful entrepreneurs such as Darius Tan from 99.co, Anthony Tan from Grab, and Forrest Li from SEA Group serve as inspiration for many aspiring entrepreneurs (EA 1 Interview; EC 5 Interview). As one interviewee remarked, "people feel like 'oh wow' if you can do it, I can also do it." (EC 1 Interview). This highlights how observations of successful role models can help to foster a sense of belief within the society that founding a startup as a career can be a real possibility.

ii) Societal norms and values

Objective cultural capital in the form of media coverage on entrepreneurship stories help to foster positive societal norms towards entrepreneurship. Society's perception towards entrepreneurs and entrepreneurship as a career has evolved considerably to one that is positive and accepting. A main theme of the interviews is that the media has helped to create an awareness of entrepreneurship as a career and foster a culture appreciative of entrepreneurship and entrepreneurs. This has resulted in entrepreneurship being increasingly seen as a viable or desirable career choice for many individuals in Singapore as people are constantly exposed to success stories of successful entrepreneurs in Singapore in the media. One venture capitalist mentioned about the increasing media coverage on entrepreneurs: "In the past few years, there has been more and more startup news, people are starting to know about startups. They are starting to hear about those successful startup stories and so people are starting to become more open to the idea of startups and working for startups." (EC 2 Interview). Similar comments made by other interviewees (ERP 6 Interview) also highlight how success stories have helped to change societal perceptions of entrepreneurship as a career and increasingly founding a startup is regarded as a worthwhile endeavour.

Aside from changing societal norms, the media has also helped to promote a set of entrepreneurial values amongst individuals as people start to undertake behaviour that is more socially desirable and related to entrepreneurship. For example, one interviewee (ERP 3 Interview) mentioned that: "[In] the media, what you see as successful Singaporeans change so much…the amount of news that the government put out, there are some core propaganda here, it really changes in terms of what a successful Singaporean is". With societal norms changing to become more acceptive of entrepreneurship as a career, individuals' own values can be affected as they are now more willing to undertake actions related to entrepreneurship, compared to when entrepreneurship was regarded as socially unacceptable. In this context, this can mean that individuals are now more likely to undertake behaviour such as risk-taking and innovating. This is evident from one interview: "Profile wise, I think the notion where last time, if you do well in school and then you would just go take a good job, I think that is less and less prevalent. Now, I do see a lot of good people taking the risk." (EA 1 Interview). In short, media has helped to motivate conformance towards a new set of societal norms and in turn promoting entrepreneurship.

iii) Entrepreneurial capabilities

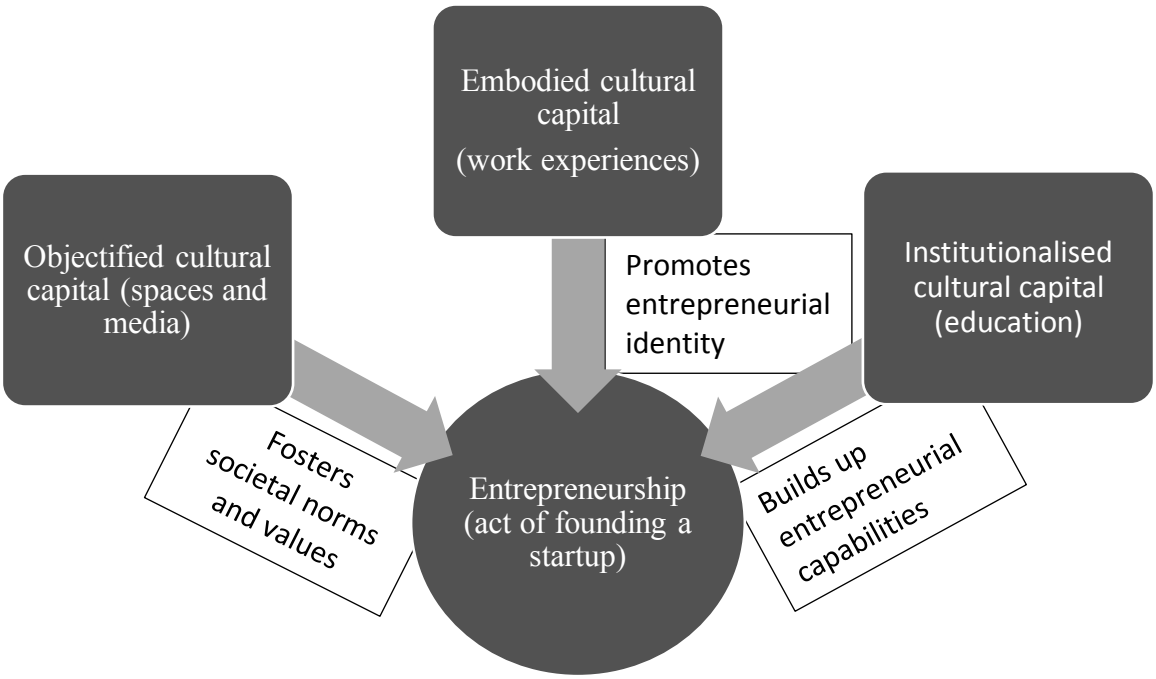
Institutionalised cultural capital in the form of entrepreneurial education helps to foster entrepreneurial capabilities amongst Singaporean students, creating a talent pool essential for founding a startup. Entrepreneurial capabilities can refer to skillset that allows individuals to complete tasks related to founding a startup, such as coding skills and business pitching.

Students' entrepreneurial capabilities are strengthened through such entrepreneurial educational programmes where they can gain new insights and skills, evident from the YES programme implemented in secondary schools. There was a consensus among the interviewees that Singaporeans are generally able to exploit market opportunities and that Singaporeans are generally well-equipped with the business skills as well as the entrepreneurial skill set to pursue entrepreneurship as a career (EC 5 Interview; ERP 1 Interview; ERP 2 Interview). As one interviewee noted, "there are also a number of programs that try and train people in various aspects of skills, soft skills, hard skills, geared towards entrepreneurship and taking on roles in startups" (ERP 5 Interview). Compared to two decades ago, Singaporeans today appear to be equipped with a wider set of skills, such as being more business-savvy and having coding abilities. With the increased entrepreneurial capabilities, individuals are in better positions to identify and pursue opportunities in innovative ways and come up with new methods of solving problems–something that is essential for "creative destruction" in innovative entrepreneurship.

4.5 Discussion and conclusion

In this study, the paper illustrated how individuals' entrepreneurial intentions can be understood through the lens of Bourdieu's cultural capital, habitus, and field. As shown in the application of these Bourdieuian ideas to Singapore's entrepreneurial ecosystem, the paper argues that cultural capital (in the form of cultural resources available) affects the individual's habitus (distinct disposition) and leads to entrepreneurship. Using the case of Singapore, the paper showed how cultural change played a role in the city-state in contributing to the rise of entrepreneurial activity in a span of two decades. We discussed the three types of cultural capital (embodied, objectified, institutionalised) in Singapore and how the presence of such cultural capital led to an increase in entrepreneurship by affecting the individual's disposition (habitus) in terms of the entrepreneurial identity, societal norms and values, and entrepreneurial capabilities (Figure 1).

Figure 1. Role of cultural capital in entrepreneurial ecosystem



For example, embodied cultural capital in the form of work experiences can help in the construction of an entrepreneurial identity and increase entrepreneurial activity. The construction of an entrepreneurial identity can take place via many forms, such as familiarisation with what the entrepreneur does. Specifically, a director of an incubator stated the importance of working experience in a startup for the overall level of entrepreneurship in the country: "Eventually this will create a critical mass of people who are familiar with the sector and in in time to come, they are all potential founders" (ERP 2 Interview). Moreover, work experiences in the startup also expose individuals to the real possibility of founding a startup, affecting their mental mode. As a policymaker noted: "I think the environment is a lot better now because a lot more people are exposed to the potential that starting a company can bring you. In the past, there were not so many good examples." (ERP 6 Interview). Such exposure to these operational startups and the first-hand experiences with the startup founders can serve as inspiration and motivation for individuals to participate in similar entrepreneurial activity in the future (Feldman, 2014; Malecki and Spigel, 2017).

On the other hand, institutionalised cultural capital such as entrepreneurship education has helped to increase entrepreneurship uptake via fostering entrepreneurial capabilities. The NOC programme is one such entrepreneurship educational programme in Singapore that has played a

key role in fostering entrepreneurial capabilities amongst students. As of 2023, NOC alumni has founded over 1000 startups and nine startup unicorns (NUS Enterprise, 2023). The impact of entrepreneurship education can be seen in many alumni who went on to become startup founders. For example, one current entrepreneur who participated in the interviews commented on the entrepreneurship-related activities during his time in the NOC entrepreneurship programme: "I think it was a fantastic experience. It gave me the license to "kill" in terms of how I could spend time during university doing all sorts of things outside of studying in the name of entrepreneurship without having to worry about my academic grades. I joined a lot of hackathons, pitching sessions, and brainstorming sessions and learnt all sorts of things related to entrepreneurship." (EA 2 Interview). Such entrepreneurial education helps to nurture entrepreneurial capabilities amongst students, preparing a pool of talent equipped with the skills required to found a startup.

Although the literature has delineated culture as a key component in the entrepreneurial ecosystem, little has been done to study how we can theorise culture as a concept and explain how culture can lead to an uptake in entrepreneurship. By studying culture in terms of the three types of cultural capital offered by Bourdieu (1977), this paper builds on the concept of the entrepreneurial ecosystem and provides greater clarity to the role of culture within the entrepreneurial ecosystem. In particular, the paper has studied culture by focusing on entrepreneurial spaces, entrepreneurship news (media), work experiences, and entrepreneurship education within an ecosystem. First, the study of Singapore is in line with wider studies that show that cultural institutions such as local success stories are essential for the entrepreneurial ecosystem to grow and develop from the "birth phase" (Mack and Mayer, 2016). Going beyond just success stories, this paper suggests that the media is also crucial as the media can help to propagate these success stories to the wider population. This can help to engender societal norms such as a greater acceptance of entrepreneurship as a legitimate career option, which can help to increase entrepreneurship.

Second, this study complements evidence elsewhere which suggest that entrepreneurial experiences in different contexts such as corporate settings or a venture team have considerable effects on an entrepreneur's identity and mental mode (Karataş-Özkan, 2011). In addition to the role of networking in the construction of entrepreneurial identity (Gausdal, 2008), this paper shows that the idea of "doing it" and being engaged in the (entrepreneurial) act itself, such as attending a startup conference or simply working in the startup also helps in entrepreneurial identity construction. Third, while literature on entrepreneurship education tend to be increasingly critical of its impact, suggesting that "entrepreneurship cannot be taught" (Neck and Green, 2011;

Fiet, 2001), this study emphasises that entrepreneurship education is still valuable. Rather than expecting students to become an entrepreneur after learning about what entrepreneurship is, the value of entrepreneurship education lies in the critical skillset that is being imparted to the students. In terms of technology entrepreneurship, an entrepreneur requires technical skills such as coding and programming to create an app and business skills such as pitching a proposal to attract investors to fund their ideas.

Overall, while the institutional literature argue that culture is unlikely to be changed easily (Scott, 1995; Parto, 2005; Hodgson, 2003; Roland, 2004), the case of Singapore suggests that informal institutions while durable, are not unchangeable. Following Saxenian's (1996) study on Boston's Route 128 and Silicon Valley, this study highlights that the Singaporean entrepreneurial ecosystem develops as the overall cultural attitude shifts in the country. The cultural changes seen in Singapore as discussed in the previous sections highlight the fact that culture is not static, and it can be changed. In particular, we see that within a span of approximately 20 years, the societal norms and values towards entrepreneurship in Singapore has changed considerably, most notably due to influences from the media's portrayal of successful entrepreneurs and the frequent coverage of startup stories to expose the public to entrepreneurship.

Moreover, the paper provides a framework for policymakers seeking to promote a culture conducive for founding startups. Complementing existing research that suggest public policies should focus more on fostering entrepreneurial culture over providing material support (Spigel, 2017a), this study further illuminates the pathways in which culture can help to promote entrepreneurship by showing how it can affect an individual's disposition, making one more inclined towards embarking on entrepreneurship. In this regard, policymakers need only to identify what type of cultural capital public policies should target, depending on whether local conditions lack entrepreneurial identity, societal norms and values or entrepreneurial capabilities.

While this paper did not study the interactions between entrepreneurial identity, societal norms and values, and entrepreneurial capabilities, we note that there can be a circular effect between these mechanisms. For example, higher entrepreneurial capabilities may reinforce an entrepreneurial identity and further motivates individuals to participate in entrepreneurship. At the same time, the paper acknowledges its limitations such as the lack of longitudinal data to analyse the 20-years entrepreneurship trajectory in Singapore and the lack of measurement data to measure culture in Singapore.

Future work could study the role of culture in other entrepreneurial ecosystems and compare their development trajectories with the Singapore case by drawing on survey data such

as the World Values Survey (Inglehart et al., 2014). For example, studies can investigate the culture in Western entrepreneurial ecosystems, such as London and Copenhagen, to compare if differences exist with Asian cases such as Singapore. Future research can also further investigate the the driving forces of the cultural shifts in Singapore towards entrepreneurship, in particular, the role of the media. Studies can conduct an in-depth analysis of news articles to investigate how the mix of messages disseminated by the Singaporean media has changed over the last 20 years. Lastly, studies can investigate if and how the act of entrepreneurship itself can have effects on culture within the entrepreneurial ecosystem. The expressive actions and the symbolic actions of entrepreneurs in their daily routines can shape the culture and communities within the entrepreneurial ecosystem, in turn promoting more entrepreneurship.

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Appendix

Table A1. Details of interviews

	Singapore			
No.	**Interview code**	**Role in the entrepreneurial ecosystem**	**Current role/designation**	**Year first active in the ecosystem**
1	EA 1	Founder, mentor	Co-founder of tech startup	2013
2	EA 2	Founder, mentor	Co-founder of tech startup	2013
3	EA 3	Founder, mentor	Co-founder of tech startup	2012
4	ERP 1	Accelerator, former founder	Manager of accelerator	2019
5	ERP 2	Incubator, mentor	Director of Incubator	2019
6	ERP 3	Policymaker	Senior manager in government body	2017
7	ERP 4	Policymaker	Manager in government body	2015
8	ERP 5	Policymaker, investor	Assistant Director in government body	2017
9	ERP 6	Policymaker	Deputy Director in government body	2013
10	EC 1	Forrmer founder, mentor, investor	Venture capitalist	2015
11	EC 2	Matching service, Investor, Ex-policymaker, mentor	Matching service	2015
12	EC 3	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2011
13	EC 4	Serial entrepreneur, founder, mentor	Co-founder of tech startup	2015
14	EC 5	Matching service, former founder, former manager at accelerator	Co-founder of matching service/Policymaker	2015

CHAPTER FIVE

CONCLUSION

5 Personal reflections

To conclude the dissertation, this section presents some of my personal reflections on the overall PhD research journey. The PhD research started in December 2019 and the opportunity to conduct this research has allowed me to delve deeper into the world of innovative startups and more broadly entrepreneurship studies, viewed through the lens of the entrepreneurial ecosystem. The dissertation addresses current research gaps in the entrepreneurial ecosystems literature by (i) providing deeper insights on the role of the state as an actor, and (ii) shedding more light on how we can understand culture as an element within the ecosystem and its effects on startup venture creation.

Without doubt, the PhD research journey faced considerable challenges and new opportunities along the way. Barely six months into the PhD, the COVID-19 pandemic happened. This has some serious implications on the project as I had to rethink the overall research question as well as the possible data collection methods to ensure that I can complete the PhD within the limited time span of three years. The overall research question was redeveloped in such a way where one of three papers could rely entirely on data that would be readily available online. This was done to reduce the delays caused by the COVID-19 pandemic as my initial proposed method of face-to-face semi-structured interviews in Singapore and Hong Kong was affected by the nation-wide travel restrictions in many countries. This eventually resulted in the culmination of one paper (Chapter Two) which relied entirely on online data from the Global Entrepreneurship Network policy database. I was fortunate to be able to co-author this paper with my host during my research stay abroad at King's College London, Robyn Klingler-Vidra, as well as Adam Chalmers and Ramon Pacheco Pardo whom I was introduced to during the research stay. For the other two papers, I was able conduct the semi-structured interviews for the data collection albeit some were done online due to the existing COVID-19 restrictions at that point in time.

Throughout 2022, I was also able to present some of my work at conferences such as the Academy of International Business UK&I and Society for the Advancement of Socio-Economics, where I received valuable feedback which helped to greatly refine my work. While reflecting upon the process and the final outcome of the PhD, I recognise that the objective to investigate

the role of the state in the entrepreneurial ecosystem has not been a straightforward and linear process. For one, the sub-questions of the research developed along the way as the research progressed. In particular, the third paper's focus on cultural change was developed as an extension of the unique findings on culture presented in Singapore and Hong Kong's entrepreneurial ecosystem. The findings on how government policy affected the culture of the Singaporean entrepreneurial ecosystem motivated me to investigate deeper into the cultural changes within the ecosystem as existing institutional literature tend to emphasise that culture cannot be changed easily (Roland, 2004; Scott, 1995). In the next sections, I discuss the main contributions of the dissertation as well as some future research directions.

5.1 Main contributions

The three papers in this dissertation use a different methodology and theoretical framework to answer different research questions. While analytically distinct, they all seek to shed light on an aspect of the entrepreneurial ecosystem, which remains under-explored. The first and second paper explored the role of the state as a key actor in the entrepreneurial ecosystem by studying the attributes of startup-centric innovation policy and investigating how government policy contributes to the development of the entrepreneurial ecosystem respectively. The third paper studied a key element within the entrepreneurial ecosystem, culture, by examining cultural change within the entrepreneurial ecosystem and how it has led to startup venture creation. Each paper has its own contributions and together, they seek to further shed light on the entrepreneurial ecosystem as a concept.

As a nascent and emerging concept, the entrepreneurial ecosystems literature is continuously growing. While the government is one of the many actors within an entrepreneurial ecosystem, there remains a lack of knowledge on the role of the state in the ecosystem (Chen et al., 2020) and how government policy intertwines with the ecosystem development (Alvedalen and Boschma, 2017; Brown and Mawson, 2019). At the same time, the causal relationship between the entrepreneurial ecosystem and entrepreneurial activity remains unclear (Stam, 2015) and more work is needed to understand how ecosystem elements affect startup growth (Nicotra et al., 2018). Collectively, the three papers in the thesis sought to answer the overall research question of "What is the role of the state in the entrepreneurial ecosystem and how does the entrepreneurial ecosystem lead to the creation of innovative startups?". In light of the analyses presented in each chapter, there are three main broader implications to consider. These broader

implications include theoretical contributions, policy recommendations, and advancement to knowledge within entrepreneurial ecosystems literature.

First, in terms of theoretical contribution, Chapter 2 develops a new theoretical framework of startup-centric innovation policy by conceptualising this policy-type into four main attributes (firm age, type of firm, target audience, and instruments). The paper contends that startup-centric innovation policy is a contemporary means of industrial policy, one focused on driving economic competitiveness, employment, and even national security through technological prowess, much like the aims of that of the developmental state. Startups, in an "open innovation" (Chesbrough, 2003) lens, are supported as part of ecosystems in which incumbent firms and new entrants benefit from increased interaction with one another. Different from the bank-based and large firm-focused developmental state, however, the paper theorises startup-centric innovation policy as emanating in an institutional context comprised by equity financiers and fluid labour markets. By making these connections, the paper strives to bring startup-centric innovation policy into the analytical lens of the entrepreneurial state, developmental state, and industrial policy research across political economy scholarship.

Second, in terms of policy recommendations, the paper in Chapter 3 several important recommendations aimed at informing policymakers on how to develop their own entrepreneurial ecosystems. The paper seeks to investigate how entrepreneurial ecosystems emerge and evolve by studying how government policy affects the development of the entrepreneurial ecosystems. The analysis shows that government policies promote the growth of entrepreneurial ecosystems by affecting its core functions. Specifically, the paper finds that government policies take the form of a "policy mix" where different policy instruments (regulative, normative, cognitive, and conducive) are combined in varying configurations. Policies coded under conducive institutions fostered ecosystem dynamics (eg. ecosystem interactions, fluidity, and diversity of entrepreneurs) underlying three ecosystem coordinative aspects: entrepreneurial actors, entrepreneurial connectors, and entrepreneurial resource providers. Policies coded under regulative, normative and cognitive institutions contributed to the ecosystem dynamics (eg. nature and availability of funding, desirability of entrepreneurship) underlying two coordinative aspects: entrepreneurial resource provider and entrepreneurial orientation. To effectively develop entrepreneurial ecosystems, governments need to come up with a "entrepreneurial ecosystem policy mix" as different ecosystem dynamics are fostered by different policy instruments. In light of the findings in this paper, there are key actionable insights for policymakers. First, policymakers should invest in capacity building across all four institutions (regulative, normative, cognitive, and conducive),

such as setting up public incubators, organising networking sessions for entrepreneurs, providing funding for entrepreneurs, and implementing entrepreneurship education. Moreover, policymakers should implement targeted interventions based on their local national context. For example, depending on their local cultural context, policymakers can promote an entrepreneurial culture conducive for startups by either focusing on prioritising technology and innovation, promoting the desirability of entrepreneurship as a career, or both.

Third, in terms of advancing knowledge on entrepreneurial ecosystems, the paper in Chapter 4 contributes to a better conceptual understanding of the functioning of an entrepreneurial ecosystem through cultural capital theory. In Chapter 4, the paper explores cultural change within the entrepreneurial ecosystem and its impact on innovative entrepreneurship take-up through the lens of cultural capital theory (Bourdieu, 1977). The analysis suggests that all three cultural capital dimensions are relevant to the performance of the entrepreneurial ecosystem and contribute to an individual's disposition towards entrepreneurship: investing in the objectified dimension of cultural capital fosters societal norms and values that are conducive for entrepreneurship, addressing the embodied dimension of cultural capital promotes entrepreneurial identity, and applying the institutionalised dimension of cultural capital enhances entrepreneurial capabilities. The paper contributes to the literature by (i) linking the performance of entrepreneurial ecosystems to cultural capital theory and (ii) enabling a theorisation and a more nuanced understanding of how culture affects entrepreneurship activity. By understanding the relevance of the three dimensions of cultural capital to entrepreneurial ecosystem performance, policymakers can promote the growth of an entrepreneurial culture by implementing policies which reflect the three types of cultural capital.

5.2 Common limitations

While the limitations of each article are discussed in the respective chapters (Chapters 2, 3, and 4), there are also several common limitations in this PhD study across the three articles. First, there is the limitation of sample size. In this PhD study, the empirical material included 298 policy documents as well as 20 semi-structured interviews from Hong Kong and 14 semi-structured interviews from Singapore. The main data collection which involved semi-structured interviews saw data saturation achieved at 20 participants and 14 participants for the investigations on Hong Kong and Singapore respectively, when no new information emerged from the interviews. The resultant small sample size may be limited in representing the diverse perspectives of the different players in the entrepreneurial ecosystem. For example, while the 14 participants for the study on

Singapore (Chapter 3) were more or less evenly distributed across the three main types of actors involved in the entrepreneurial ecosystem (Brown and Mason, 2017), the ethnicities of the participants were not evenly distributed across the three main ethnicity groups found in Singapore. Out of the 14 participants, 4 were from the minority group (Malay, Indian and Caucasian) and 10 were from the dominant Chinese ethnic group. This may have impacted on how diverse ethnic representation was in the sample size. Racial minorities may face a different experience of the entrepreneurial ecosystem (Cheng, 2015; Yasin and Hafeez, 2023), unlike the dominant Chinese ethnic group, and the findings may not be representative of the diverse experiences face by different ethnic groups. Moreover, from a gender perspective, 10 out of the 14 participants were male and this may lead to an over-representation of the male perspective, leading to a potential gender bias in the findings. For example, within the entrepreneurial ecosystem, females may face disadvantages in terms of funding options (Coleman and Robb, 2009; Agier and Szafarz, 2013) and networking opportunities (Abraham, 2020).

Second, this PhD research faced cost and time constraints. This research received funding for 3 years, starting December 2019, and data collection was severely impacted by the Covid-19 pandemic. The extraordinary circumstances meant that this research had to work within the resource and time constraints. For example, traveling to the respective locations to conduct the numerous face-to-face interviews was both time-consuming and difficult in terms of practicality during the Covid-19 interview. The scope of the research had to be limited and due to these practical considerations, the sample size that I could work with was also smaller. If there was a longer funded timeframe, the work could have benefitted from more interviews conducted, where the representativeness of the interviews could also be strengthened by including the gender and racial aspect.

Third, as with all qualitative research, this works faces the limitation of its generalisability to other contexts. While the findings from this qualitative may not be statistically generalised to a larger population, the findings can be applied to other similar contexts. Specifically, the findings from Chapter 3 are transferrable to other small and open city-states in which government policy seeks to develop their own entrepreneurial ecosystems. The findings in Chapter 4 can also be applied to major cities with weak entrepreneurial culture to better understand how to develop such entrepreneurial ecosystems with a lacking culture. Last, this PhD research studied Hong Kong and Singapore's entrepreneurial ecosystem and specifically made use of data drawn from semi-structured interviews conducted in Singapore in two out of the three articles. As a Singaporean, I

recognise the potential researcher bias that may occur when it comes to interpreting and analysing the data collected from my own home country about the local entrepreneurial ecosystem.

To conclude, I propose three avenues for future research. First, future studies could expand the scope of this research by further delineating the startup growth journey into startups and scaleups. Research can be conducted on whether there are any substantive differences between innovative startup policies and innovative scaleup policies. For example, findings from this PhD research reveal that startup policy instruments target the four main types of capital: economic, human, physical, and social. A further study can investigate if scaleup policy still target these four types of capital or if scaleup policy targets only a particular type of capital, considering that scaleups face different challenges as they progress into the scaleup stage. Second, this PhD study focused on studying the role of government policy in two East Asian entrepreneurial ecosystems (Singapore and Hong Kong). As Singapore and Hong Kong are examples of city-state economies, future research can study government policy in other East Asian entrepreneurial ecosystems situated in larger countries, such as Tokyo in Japan and Seoul in South Korea. This can generate more nuanced findings on the role of the state in entrepreneurial ecosystems by exploring other types of policy instruments for ecosystem growth as well as other types of entrepreneurial ecosystem policy mix. Last, future research could build on this study by expanding the sample size via conducting more semi-structured interviews. Instead of recruiting interview participants via fulfilment of the three main categories: entrepreneurial actors, entrepreneurial connectors, and entrepreneurial resource providers (Brown and Mason, 2017), the criteria could be adjusted by expanding the categories. Categories could be further delineated by specifying if the participant fitted the criteria of being either an accelerator, customer, entrepreneur, incubator, investor, mentor, policymaker, or university (Isenberg, 2011; Brown and Mason, 2017; Stam and van de Ven, 2021).

5.3 Final remarks

Overall, the dissertation which comprises three papers, focuses on the wider context in which innovative startups function within, otherwise known as the entrepreneurial ecosystem. Ultimately, the dissertation is a small step on my part, at enhancing the entrepreneurial ecosystem framework, which has emerged in the last 15 years. Aside from the theoretical and policy contributions outlined above, this dissertation also hopes to inspire more research to be done on the entrepreneurial ecosystem, further strengthening the proliferation of the concept to be used both in academic research and within the policymaking sphere. To this end, future research could

further investigate the role of the state within entrepreneurial ecosystems, by studying other East Asian developmental states, such as Japan, South Korea, and Taiwan. A typology of state involvement in the entrepreneurial ecosystem could be developed when we have more insights into what the state can do to develop entrepreneurial ecosystem. At the same time, more research can also be conducted in terms of entrepreneurship policymaking processes. The policy process involves many different phases and a better understanding of the startup policy formulation process can help entrepreneurship scholars gauge how and when we can gain most traction with policymakers using our academic research.

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