Universidade de Évora - Instituto de Investigação e Formação Avançada

Programa de Doutoramento em Gestão

Tese de Doutoramento

Developing entrepreneurial ecosystems – Characteristics and challenges for entrepreneurship policy

João Carlos Dinis Candeias

Orientador(es) | Soumodip Sarkar

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A tese de doutoramento foi objeto de apreciação e discussão pública pelo seguinte júri nomeado pelo Diretor do Instituto de Investigação e Formação Avançada:

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DEVELOPING ENTREPRENEURIAL ECOSYSTEMS – CHARACTERISTICS AND CHALLENGES FOR ENTREPRENEURSHIP POLICY

Abstract

Entrepreneurship is generally recognized as a source of economic growth. Recently entrepreneurship research has shifted its focus from entrepreneurs and firms, towards the development of entrepreneurial ecosystems (EE). This emerging concept merits growing attention from academics and policymakers to the point of representing a leading drift in entrepreneurship policy and development strategies of numerous countries and regions. As well as capturing the attention of a growing number of scholars, from which emerges an appealing and fast-growing body of literature.

However, the study of EE is recent, undertheorized, and fragmented. Gaps in this body of literature suggest there is a need to extend EE research and develop solid and coherent theoretical frameworks, particularly in what concerns to the effects of entrepreneurship policies. Policy and entrepreneurship are symbiotically interconnected, where research plays an important role in providing policymakers valuable insights. Without adequate theoretical foundations to guide its formulation, policies risk being ineffective and even hinder the development of EEs. This research is motivated by calls for the development of policy related research, regarding the development of EEs, and aims to provide a clearer view of the characteristics, formulation options and implementation process of these policies.

This research followed a multi-method approach. Beginning with an analysis of six EE qualitative studies from different countries, to extract the characteristics of effective EE policies (EEP). The second part of the research departs from extant literature to

identify the parameters for EEP formulation and provide a conceptual framework to guide its formulation. The third part addresses the process of EEP formulation and implementation, extending the use of effectuation theory to provide an improved model supported by empirical illustrations of policies evidencing effectual characteristics.

The fourth part includes the analysis of the impact of digital technology in the development of EEs by using the concept of affordances.

DESENVOLVIMENTO DE ECOSSISTEMAS DE EMPREENDEDORISMO – CARACTERÍSTICAS E DESAFIOS PARA AS POLÍTICAS DE EMPREENDEDORISMO

Resumo

O empreendedorismo é globalmente reconhecido como uma fonte de crescimento económico. Recentemente, a investigação na área do empreendedorismo transferiu o seu foco dos empreendedores e empresas para o desenvolvimento de ecossistemas empreendedores (EE).

Este conceito emergente desperta uma atenção crescente de académicos e *policymakers*, representando uma tendência dominante na política de empreendedorismo e nas estratégias de desenvolvimento de vários países e regiões. Simultaneamente tem captado a atenção de um número crescente de académicos, gerando uma literatura cativante e em rápido crescimento.

No entanto, o estudo dos EE é recente, pouco teorizado e fragmentado. As lacunas nesta literatura sugerem a necessidade de alargar a investigação e desenvolver fundamentos teóricos sólidos e coerentes, especialmente quanto aos efeitos das políticas de empreendedorismo. Política e empreendedorismo estão simbioticamente interligados, promover mais investigação é fundamental para desenvolver conhecimento relevante para os *policymakers*.

Sem fundamentos teóricos adequados para orientar a formulação de políticas, estas arriscam ser ineficazes e até prejudicar o desenvolvimento dos EEs. A investigação produzida nesta tese é motivada por sucessivos apelos ao desenvolvimento de pesquisa relacionada com políticas de desenvolvimento de EEs (EEP) e visa fornecer uma visão mais clara das suas características, opções de formulação e processo de implementação.

Esta investigação seguiu uma abordagem multi-método.

Começando com uma análise de seis estudos qualitativos de diferentes países, a qual permitiu extrair características de EEPs eficazes.

A segunda parte partiu da literatura existente, identificando parâmetros para a formulação das EEP e desenvolver uma estrutura conceptual para a sua formulação.

A terceira parte, aborda o processo de formulação e implementação de políticas, recorrendo à teoria da *effectuation* desenvolvendo um modelo melhorado para as EEP, apoiado por ilustrações empíricas de EEP com características *effectual*.

Por fim, na quarta parte é analisado o impacto da tecnologia digital no desenvolvimento de EEs, utilizando o conceito de *affordances*.

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CHAPTER 1

INTRODUCTION

This chapter presents the key concepts, the background, the research problem, identified research gaps, and the outline of the thesis. Concretely, it provides a brief description of the entrepreneurial ecosystem (EE) and entrepreneurial ecosystems policies (EEP) concepts, underlining their relevance. Chapter 1 also introduces the research background of the thesis, highlighting the relevance of EEPs in the context of EEs and its impact in their development and evolution path. The chapter closes with an outline of the thesis.

1.1 MOTIVATION AND OVERVIEW

The recognition of the entrepreneurship phenomenon's pivotal role for economic development, provides increasing traction to entrepreneurship research and captures growing attention from academics, to the point of being now a well-established scholarly field with great academic legitimacy (Fayolle et al., 2016). Within this dynamic field, the EE is an emergent concept that has captured a rising interest from policymakers, scholars and multiple social actors.

Guided by the widely-accepted understanding that the role of government and EEPs is pivotal for the development of EEs (Spigel, 2017; Stam, 2015), a plethora of EEPs has been formulated and implemented. For over a decade policymakers have focused on supporting the development of EEs, concurrently scholars progressively shifted their attention from entrepreneurs and ventures to EEs (Malecki, 2018; Roundy, 2019a).

However, the study of EEs is still recent, undertheorized, and fragmented. Particularly in what concerns to the capacity to clarify the influence of EEP on the development path of ecosystems (Feldman & Lowe, 2018; Stam & van de Ven, 2021). Adding to the aforementioned, competing views of how to develop an EE coexist in extant literature (Colombo et al., 2019). In this context, EEPs run the risk of being ineffective, hindered by the inexistence of consistent theoretical underpinnings to support its formulation (Brown & Mawson, 2019). The lack of adequate theoretical frameworks, leads policymakers to replicate EEPs from well-known ecosystems, this policy isomorphism frequently fails since each ecosystem evolves in a unique context (Spigel, 2017; Stam & van de Ven, 2021).

So far, despite its recent burgeoning development, literature has mainly provided lists of significant factors for the development of EEs (Alvedalen & Boschma, 2017; Stam, 2015) focusing on providing some insights into the contextual characteristics and the nature of the EEs (Spigel, 2017; Stam, 2015). Notwithstanding the existence of a consensus regarding the importance of EEP in supporting the ecosystem's development, and policy being included in most lists of factors and models of the EE, there is still no theoretical development that goes beyond generic references to its relevance (Feldman & Lowe, 2018; Stam & van de Ven, 2021).

This thesis aims to contribute to the development of the EE domain and its literature, by providing answers to some of these questions, in this way offering relevant theoretical

underpinnings that improve our understanding of the influence and role of EEPs in the development of EEs.

1.2 RESEARCH BACKGROUND

This section introduces the central concepts of entrepreneurial ecosystem (EE) and entrepreneurial ecosystem policies (EEP). A summary of these concepts and a definition are presented.

1.2.1 Entrepreneurial ecosystem

Over the last 25 years, the representational gap between the fields of economics and life sciences has narrowed, yielding tangible economic insights (Auerswald, 2015, p. 3). The concept of EE provides one such bridge, by adopting the ecosystem concept, applied in biology for almost a century, to the study of entrepreneurship (Audretsch, Cunningham, et al., 2019; Cavallo et al., 2019).

The influential work by James Moore (1993) marks a landmark in the adoption of the ecosystem metaphor in social sciences, and in particular in management (Brown & Mason, 2017; Malecki, 2018; Neumeyer & Santos, 2018; Roundy et al., 2017). Its introduction in the entrepreneurship field followed from the seminal article of Cohen (2006) and the pivotal texts of Isenberg (2010) and Feld (2012). Cohen (2006, p. 3) considers an EE as "an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures". This early conceptualization was based on closely related concepts that predate, but lack EE's specific association to the ecosystem metaphor, such as

Spilling's (1996) definition[1] of an entrepreneurial system and Van de Ven's (1993) infrastructure for entrepreneurship (Alvedalen & Boschma, 2017; Stam, 2015). However, the use of the term entrepreneurial ecosystem became widespread only in the last decade, particularly since 2016, supplanting the related concepts, that albeit still sparsely referred in EE literature (Malecki, 2018), did not gain similar traction and find reference mostly in earlier publications, thus having a lesser influence (Alvedalen & Boschma, 2017).

However, despite the increased academic attention, EE research "has so far been constructed *ad hoc* by different authors, without any shared definition" (Stam, 2015, p. 1765) thus becoming fragmented. Theory straggles behind the swift increase in popular interest, while the lack of solid theoretical frameworks and systematic analysis of empirical evidence precludes advancing into the study of broader topics (Spigel & Harrison, 2018). Consequently, the field is recurrently acknowledged as fragmented and undertheorized (Autio et al., 2018; Cao & Shi, 2021; Nordling, 2019), the inexistence of a commonly accepted definition (Stam, 2015) fittingly demonstrates this point. In view of this lack of consensus and in the interest of clearness, we describe an EE as a community of diverse and interdependent actors that support self-sustainable processes of venture creation and growth, by interacting in complex ways within an entrepreneurial conducive environment.

1.2.2 Entrepreneurship policy for entrepreneurial ecosystems

The promotion of entrepreneurship has become an essential element of public policy (Audretsch et al., 2007), a key element in economic development strategies of many governments (Arshed et al., 2014), to the point of being now deemed as part of the

[1] "The entrepreneurial system consists of a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality."

'cultural zeitgeist' (Nightingale & Coad, 2014). Naturally, entrepreneurship policy has evolved and adapted to changes in the economic context in the last decades.

It has been argued the EE approach emerged as a response to the ineffectiveness of entrepreneurship policies, that aimed at improving framework conditions for a specific type of firm, more specifically high growth firms (Mason & Brown, 2014). However, it is possible to frame the rise of the EE approach in a much broader process of entrepreneurship policy evolution, which began in the 80's, with the emergence of policy focused on the support to Small and Medium Enterprises (SMEs). By then SMEs were deemed as the main source of job creation and wealth (Hechavarria & Ingram, 2014; Landström et al., 2012). SME support was later deemed ineffective and driven by the effects of the financial crisis that emerged around 2008. Consequently many governments shifted their efforts from promoting SMEs to supporting high growth firms (Motoyama & Knowlton, 2016). As aforementioned, the lack of results from the support to high growth firms, in turn, paved the way for a shift in the focus of entrepreneurship policy, from the high growth firms, towards the support of the development of EEs. Simultaneously scholars progressively changed the focus of research from entrepreneurs and firms towards EEs (Roundy, 2019a).

Although the study of EEs is a relatively recent domain, with conceptual and theoretical research still in its infancy (Autio & Levie, 2017), this combination of the two concepts, entrepreneurship and ecosystem (Stam, 2015) quickly captured the interest of both academic and policy communities, becoming a thriving area of research.

Extant EE literature reflects this connection, and its analysis suggests a clear and even a natural connection with entrepreneurship policy. To mention just a few, Isenberg (2010, 2014) addresses the relevance of government intervention, namely regarding entrepreneurship as a policy priority. Autio et al. (2014) and Ács et al (2014) focus on the

implications of policy in EEs. Mason and Brown (2014) also address policy issues, regarding the challenges for policymakers and policy intervention. Entrepreneurship policy and policy interventions are also addressed in highly cited papers that are part of EE literature, e.g. (Audretsch & Belitski, 2017; Brown & Mason, 2017; Stam, 2015) and also in recently published references, (e.g., Cho et al., 2022; Johnson et al., 2022; Kantis et al., 2020). Therefore, it is clear that entrepreneurship policy is a key issue in this body of literature. Furthermore, EE and entrepreneurship policy are two concepts deeply interconnected.

The term entrepreneurship policy has been used in different contexts and encompasses a broad scope of policies whose aim has shifted and evolved (Arshed et al., 2014; Autio, 2016). This evolution in the understanding of what is entrepreneurship policy, has been molded by the economic context and the increasing relevance of the promotion of entrepreneurship in the economic development strategies of numerous governments (Ács et al., 2014). We understand entrepreneurship policy as the diverse set of policies that are implemented with the purpose of increasing the level of entrepreneurial activity (Audretsch, Belitski, et al., 2021; Gilbert et al., 2004), by inducing a continuous flow of entrepreneurs, and ensuring the existence of conditions that enable the success of their enterprises (Arshed et al., 2014; Lundstrom & Stevenson, 2005).

The International Compendium of Entrepreneurship Policies (OECD, 2020) defines three types of entrepreneurship policies; improving institutional conditions for entrepreneurship, direct support to entrepreneurs and start-ups, and holistic approach to support the development of EEs. This thesis is focused in the third type.

EE literature acknowledges that developing ecosystems represents a complex task, therefore challenges for this type of entrepreneurship policy, we refer as EEP, are more demanding than those engaged by the more traditional and still prevalent framework

policies (Audretsch, Belitski, et al., 2021; Autio & Levie, 2017). EE development requires going beyond the usual entrepreneurship policies and their foundations, namely those founded on the system failure (Autio, 2016) or the market failure rationale (Stam, 2015).

The ecosystem integrates a heterogenous set of actors, interacting in complex ways, this key characteristic of the EE approach (Isenberg, 2010; Theodoraki et al., 2018), implies that EEP must consequently target various actors, connectors, resource providers and entrepreneurial orientations (Brown & Mason, 2017), a combination of different types of entrepreneurial activity and regional contexts that produce different types of outcomes (Audretsch & Belitski, 2021).

This systemic nature of EEP, imposed by the systemic and complex character of ecosystems, differentiates this type of policies from the other entrepreneurship policies (Mason & Brown, 2014). To be effective, EEPs must support the development of the ecosystem engaging its systemic nature with equally systemic policy approaches (Brown et al., 2016).

EEPs are a subset of entrepreneurship policies (Autio, 2016; OECD, 2020), this type of entrepreneurship policies, adequate for developing EEs, is different, more complex, and involves the co-creation of a context for productive entrepreneurship (Stam, 2018). We understand EEPs as a set of policies implemented with the purpose of developing a thriving EE through a holistic approach (Arshed et al., 2014; Autio & Levie, 2017; OECD, 2020) by creating a favorable context for the expansion of productive entrepreneurship (Stam, 2018).

1.3 RESEARCH PROBLEM

This thesis investigates the phenomenon of EE, this emerging concept, captures the attention and interest of a broad audience that includes entrepreneurs, academics, policymakers, a variety of organizations, local, regional and national governments. However, theory development lags behind the rapid rise in interest. The lack of solid theoretical development hinders the advance of the domain (Spigel & Harrison, 2018) that is recurrently acknowledged as fragmented and undertheorized (Autio et al., 2018; Cao & Shi, 2021). Gaps in this body of literature suggest there is a need to extend EE research and develop solid and coherent theoretical frameworks, particularly in what concerns to the effects of entrepreneurship policies.

This research aims to contribute to the development of the EE research domain and its literature, focusing on EEP, in other words entrepreneurship policies implemented with the purpose of developing EEs. Advancing research by studying EEPs' characteristics, formulation options and implementation process, and thereby uncovering relevant theoretical underpinnings that improve our understanding of the influence and role of EEPs in the development of EEs.

Without adequate theoretical foundations to guide its formulation, policies risk being ineffective and even hinder the development of EEs. The importance of well formulated policies is even more pertinent in peripheral regions, given the constraints on resources such as capital (Brown et al., 2016) or in regions with a weak or inexistent entrepreneurial culture (Fritsch et al., 2019).

Moreover, generic solutions have a limited utility, since each ecosystem has a unique context, evolves in a single fashion and there are no "one size fits" all solutions (Spigel, 2017; Stam & van de Ven, 2021). Nevertheless, facing the lack of insights provided by research, policymakers often replicate EEPs from well-known ecosystems, this represents

an essential problem, since in EEs policy isomorphism frequently fails, for the aforementioned reasons. EEPs should be formulated considering the specific context and evolution path of the ecosystem.

Hence, our research problem and research questions are:

Research Problem: How do EEPs impact the development of EEs?

Research question 1: What are the characteristics of effective EEPs?

Research question 2: What are the parameters for formulating EEPs?

Research question 3: How can we explain and improve the process of formulating and implementing EEPs?

Research question 4: What is the impact of digital technology in the development of EEs?

1.4 RESEARCH METODOLOGY

This research followed a multi-method approach. The approaches for each paper were develop departing from the research problem and research questions described in the preceding section.

The first proposes to uncover the characteristics of effective EEP. From an initial analysis of published EE literature and considering the purpose of our research we adopt and aggregative, evidence-based method to synthesize knowledge from the evidence found in literature, systematically synthesizing the results of qualitative studies (Combs et al., 2019; Hoon, 2013; Rauch et al., 2014). The approach provides a tool for theory building (Habersang et al., 2019; Hoon, 2013) and producing evidence-based insights.

This provides an alternative path to antecedent studies in this domain that have examined particular ecosystems. Instead, our approach aggregates and synthesizes evidence from published qualitative studies, covering a small, yet diversified set of EEs from different countries, dimensions and characteristics. By comparing different qualitative studies we can clarify if a finding is consistent and replicable, offering a sounder foundation for developing theory or explanation (De Massis & Kotlar, 2014; Hoon, 2013).

The second part of the research aims to develop a conceptual framework that comprises key parameters to inform the formulation of EEP. The development of EEs requires a customized mix of policies, formulated according to the specific characteristics of the ecosystem. This need is driven by the unique characteristics of each ecosystem (Isenberg, 2010; Mason & Brown, 2014), the need to ensure an effective allocation of resources (Autio, 2016; Stam, 2015) and the complex, self-regulating and interconnected nature of the EE (Isenberg, 2014; Stam, 2015). This paper departs from extant literature to identify the parameters for EEP formulation and provide a conceptual framework to guide its formulation. So far despite recognizing the important role of EEP most research does not advance beyond generic descriptions, with limited pertinence for governments and policymakers (Feldman & Lowe, 2018; Stam & van de Ven, 2021).

The third part addresses the process of EEP formulation and implementation. This relevant issue is still barely tackled by EE literature, being relevant for advancing EE research but also to policymaking and practice. It has been argued that a possible route for advancing EE research is extending the use of other theories and literatures, that engage similar issues and therefore can provide useful insights (Cobben et al., 2022). This strategy has solid precedents in entrepreneurship literature (e.g., Fisher, 2012; Ghezzi, 2019; Welter et al., 2016). To follow this theoretically focused development course, we resort to the effectuation theory (Sarasvathy, 2001, 2008; Sarasvathy et al.,

2014) that is compatible with the EE's specific characteristics, has addressed similar circumstances, and finds support in empirical illustrations of effectual characteristics in EEPs. Namely EEs development involves uncertainty (Carayannis et al., 2022; Feldman & Lowe, 2018), and EEs emerge from a combination of resources and attributes, that can be combined in different ways (Spigel, 2017).

Finally, the fourth chapter addresses one emerging subject in EE research, the impact of digital technologies in the development of EEs, in particular the impact of digital platforms (Elia et al., 2020; Nambisan et al., 2019; Song, 2019). Our research links entrepreneurship and digital technology, bearing in mind the importance and prevalence of both concepts. The lack of insights regarding their connection in the context of EEs represents a notable gap (Song, 2019; Sussan & Acs, 2017). Affordances play a key role in the transformation of entrepreneurship, as a result of the growing "infusion" of digital technology (Nambisan et al., 2019). In this paper we make use of the affordance theory as a theoretical lens to examine the impact on entrepreneurial activity and on the entrepreneurial process created by digital artifacts (high speed internet and digital platforms). Taking the entrepreneurs' perspective on the impact of digital technology to study the effects and link across different levels. We address the aforementioned gap while providing an empirical illustration. The phenomenon of 'Taobao villages' provides the empirical context from which we address our research question. The answer contributes to a broader scholarly understanding of objective, actor-independent factors in ecosystem creation and does so in a regional context still underexplored by EE research.

1.5 OUTLINE

This thesis is structured as a set of papers that are published or submitted to peer-reviewed journals and presented at an international conference. On one hand, this option allows the papers to benefit from improvements introduced during the peer-review process. However, on the other hand, we acknowledge that this also leads to some restatement, especially in what concerns to key concepts in the introductory sections. Nevertheless, the upside clearly surpasses the eventually less positive consequence.

Chapters 1 and 6 contain the introduction and conclusion. As for chapters 2 to 5 each corresponds to a paper. Sections, figures, and tables were renumbered to be presented in a uniform stile and include the chapters number for easier reference.

Figure 1.1 presents an overview of how the four chapters are structured, regarding the key issue and the main contribution for each, in the context of the complete research project.

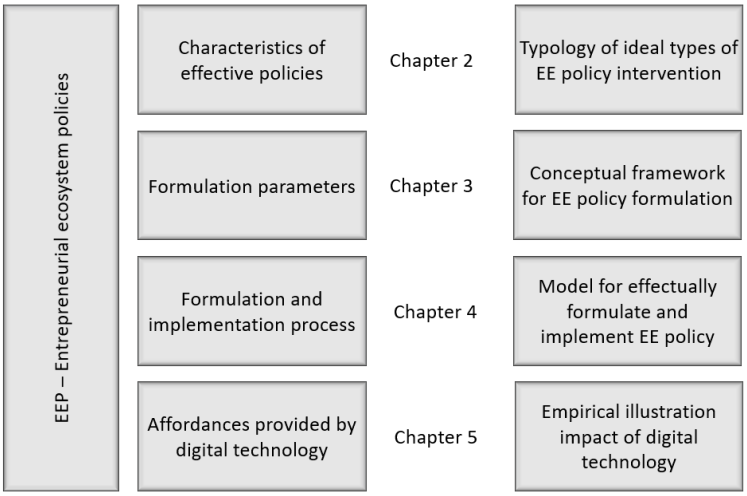

Figure 1-1 - Thesis outline

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CHAPTER 2

ENTREPRENEURIAL ECOSYSTEMS AND DISTINGUISHING FEATURES OF EFFECTIVE POLICIES- AN EVIDENCE-BASED APPROACH

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Abstract

A generalized belief in entrepreneurship as a source of economic growth ensures sustained interest in the entrepreneurial ecosystem (EE) concept, capturing the attention of governments and regional authorities. This has generated a plethora of public policies aimed at creating and developing EEs, frequently without solid theoretical and empirical foundations for its design, with consequent policies risking being ineffective. To address this, we develop theory through a systematic synthesis of qualitative studies, exploring a set of EEs, from different countries, dimensions, and characteristics. Our evidence-based approach diverges from extant studies that frequently examine a single ecosystem. The results of the systematic synthesis led us to propose a typology of ideal-types of

intervention, the *ecologist*, the *creator*, the *promoter* and the *landscaper*. These provide a path towards the development of a better understanding of the type of dominant policy intervention in EE, also enabling the study of policy evolution and its alternative trajectories regarding future development. By using an evidence-based analysis, we enhance coherence through incorporating diverse perspectives not as conflicting or contradictory, but as part of a structured set of policymaking options. This sets a basis for future research, especially related to the evolution process, and provide evidence-based advice for practitioners.

Keywords: entrepreneurial ecosystems; evidence-based; public policy; systematic synthesis; typology

2.1 INTRODUCTION

The belief in entrepreneurial activity as a source of economic growth is now generally acknowledged (Ferreira et al., 2017; Motoyama & Knowlton, 2016; van Burg & Romme, 2014). Boosted by this ubiquitous belief in its value as a source of economic growth, the entrepreneurship phenomenon has gained increasing relevance, emerging as a well-established scholarly field with great academic legitimacy (Fayolle et al., 2016). Within this vibrant and diverse domain, an emerging concept of great interest for policymakers, scholars as well as for various social actors, is the entrepreneurial ecosystem (EE). We understand an EE as a community of diverse and interdependent actors who support self-sustainable processes of venture creation and growth, by interacting in complex ways within a venture conducive environment.

EEs' popularity has led policymakers, national governments, and regional authorities to enthusiastically adopt the concept, eventually leading to a plethora of public policies aimed at creating and expanding EEs. However, EE as a phenomenon remains under-theorized (Autio et al., 2018), with essential theoretical and empirical questions remaining unanswered. Moreover insights for public policy are scarce (Stam, 2015) and its role remains unclear (Nordling, 2019). Consequently such policies risk being formulated without solid theoretical and empirical foundations (Brown & Mason, 2017). Public support for EE is essential but is frequently converted into a misguided pursuit of a 'Silicon Valley type' of ideal ecosystem, unreachable and inadequate to their specific reality (Isenberg, 2010).

Notwithstanding its relevance in the development of EE, the role of government/public policy has received little attention from scholars (Ferreira & Wanke, 2019; Spigel et al., 2020). So far, the existing literature regrettably tends to remain

focused on the individual, firm behaviour or it's characteristics within the ecosystem (Autio et al., 2018; Cavallo et al., 2019).

Policymakers can benefit from evidence-based entrepreneurship (Frese et al., 2014), such evidence deemed essential for the development and maturity of the entrepreneurship research domain (Rauch et al., 2014). The scope and depth of the policy measures undertaken have led to calls for further research to improve our understanding of the effects of public policies (Brown et al., 2017; Stam, 2015). The classic rationales for government intervention (externalities, abuse of market power, public goods and asymmetric information), are not sufficient to encompass all the questions raised by developing, and sustaining entrepreneurship and innovation (Stam, 2015).

Our work is motivated by the concern to contribute to the development of theory, and contribute to the conceptual maturity of a domain that has taken hold of national and regional government agenda, despite a lack of understanding of the impact of public policy interventions (Stam, 2015). Faced with under-theorization, policymakers tend to import best practices from successful EEs, often unfit for their own ecosystem (Spigel, 2017; Spigel et al., 2020). Policy approaches for EE development, hinge between 'ecologists' that accept the natural evolution of the ecosystem and 'creators' that actively intervene allocating resources, costs and benefits (Colombo et al., 2019; Stam, 2015). This unsettled duality of approaches to public policy interventions in EE development, prompts us to examine the relation between the level of government intervention and the impact of public policies on EEs.

Bearing in mind the aim of our research we adopt a strategy of systematically synthesizing the results of qualitative studies (Combs et al., 2019; Hoon, 2013; Rauch et al., 2014). This aggregative, evidence-based method allows us to synthesize knowledge from the evidence found in the entrepreneurship literature. While extant studies have

examined particular ecosystems, our approach aggregates evidence from published qualitative studies of different EEs using a single analytic framework (Rauch et al., 2014), covering a small, yet diversified set of EEs from different countries, dimensions and characteristics. This approach provides a tool for theory building (Habersang et al., 2019; Hoon, 2013) producing evidence-based insights.

Our paper offers three key contributions to EE research. First, we examine and systematically synthesize information from a set of qualitative studies, moving the EE body of knowledge a step forward by aggregating and extending extant findings, tackling the still fragmentated knowledge of this field. This process adds insights towards a clearer and wider view of public policy interventions. Enabling the development of the foundations for the advance of EE theory and a tool for assessing whether theoretical findings on the impact of public policies can be applied to different regional contexts. Recent EE literature often provides lists of significant factors, however, their evidence base is rather limited and the causality is not clear (Alvedalen & Boschma, 2017; Stam, 2015). We follow a different path, building theory by grounding our findings in a rich and often underexplored resource, drawing insights from extant knowledge. We therefore answer calls for further evidence-based theory building (Aguinis et al., 2018), especially in the specific area of entrepreneurship research (van Burg & Romme, 2014), fundamental to its theoretical development and consistency (Rauch et al., 2014).

Second, we convey a comprehensive view of public policy interventions resulting from the systematic synthesis into a typology, through the identification of recurrent patterns across the examined studies (Hoon, 2013; Rauch et al., 2014). The typology is organized along two relevant dimensions (Doty & Glick, 1994; Post et al., 2020), a dominant type of policy intervention, and the level of public intervention. Comprising of

four ‘ideal-types’ of intervention (Doty & Glick, 1994), we classify these four ideal-types as the *ecologist*, the *creator*, the *promoter* and the *landscaper*.

Each ideal-type results from a unique and interrelated combination of attributes that will determine an output (Doty & Glick, 1994). Typologies offer a route towards a clearer and more precise grasp of a phenomenon by incorporating insights from existing knowledge (Jaakkola, 2020). This approach is supported by several examples in prominent management literature (Harms et al., 2009). Our typology based around ideal-types provides a framework for understanding the current state of an EE regarding the level and dominant type of public policy interventions and in addition study their evolution path and alternative choices for future development. This offers a more comprehensive perspective on the nature of public policy interventions, through an evidence-based research strategy in the EE empirical context. Furthermore, ideal-types provide a foundation for future research in the field, highlighting the areas that have been overlooked or less investigated, and encouraging scholars to advance theoretical and empirical research, contributing to coherence and development of knowledge.

Third, we offer practitioners and policymakers evidence-based and generalizable guidance for the design and enactment of public policy interventions, providing insights vital for policy design, opening the public policy ‘black-box’. To most practitioners it remains unclear how public policy impacts the development of EEs, and what should be done to promote their growth. Our research takes stock from the EE literature, to identify relevant evidence for EE practice. Aggregating qualitative information from existing research to offer evidence-based, pragmatic, and actionable insights of the impact of different types of public policy intervention regarding EE development. Typologies are valuable for theorists and practitioners (Delbridge, 2013) thus by delving into the types of public policy interventions we encourage the engagement and provide insights that can

be useful for a broad range of EE stakeholders as well as for academics, students, and consultants. Therefore, our research harmonizes the theoretical and practical utility of the EE literature and integrates different and partial views of the role and scope of public policy intervention.

The remainder of this paper is organized as follows. We first summarize the evolution of the EE concept and outline the role of public policies in the EE literature. In the succeeding sections we explain our method and present our findings delving into four characteristics of effective public policy interventions. This is followed by the discussion of our findings in which we present our theoretical framework comprising of a typology and four ideal-types, finally, we provide the conclusions and limitations of our study, also proposing future research prospects.

2.2 THEORETICAL BACKGROUND

Moore's (1993) influential article on the ecology of competition set in motion the adoption of an ecosystem analogy in social sciences, and in particular in management (Malecki, 2018; Neumeyer & Santos, 2018). Taking cue from this line of thought, the pivotal work of Cohen (2006) and Isenberg (2010) and Feld (2012) introduced the ecosystem metaphor to the entrepreneurship domain.

The EE concept only became more widespread in the last decade (Alvedalen & Boschma, 2017; Stam, 2015), gaining further importance since 2016 (Malecki, 2018). The related concepts that predate and influenced the emergence of the EE, lack attributes of sustainability (Sussan & Acs, 2017). Earlier descriptors such as the 'entrepreneurial system' (Spilling, 1996) or 'infrastructure for entrepreneurship' (Van De Ven, 1993) lost leverage, thus having a restricted impact (Alvedalen & Boschma, 2017; Malecki, 2018).

As the EE concept gained traction, it became more fragmented, and 'has so far been constructed ad hoc by different authors, without any shared definition' (Stam, 2015, p. 1765), lacking solid theoretical frameworks and systematic study of empirical evidence. Consequently EE has been deemed as a chaotic conception, falling behind widespread interest in this approach (Spigel & Harrison, 2018). This gives credence to earlier calls to further the development of evidence-based knowledge in the entrepreneurship domain (Frese et al., 2014; Rauch et al., 2014).

The EE literature has emerged primarily from two lines of research, both rooted in ecological systems thinking - regional development, and strategy (Stam 2015). The former focuses on the study of the differences in regional performance while the latter on value creation (Acs et al., 2017; Spigel, 2017). Regional development researchers share the interest on the role of the external business environment, as well as in entrepreneurship, with other theoretical approaches such as clusters, industrial districts, innovation systems. It differs however by focusing first on the individual entrepreneur rather than the enterprise (Acs et al., 2017; Malecki, 2018; Stam, 2015; Stam & Spigel, 2017). In turn, strategy scholars have focused on the coordination and value appropriation between firms in an ecosystem e.g. (Adner, 2017; Adner & Kapoor, 2010; Iansiti & Levien, 2004).

To gain some insights behind the fragmented development of EE literature, and as a starting point, we first performed a bibliometric analysis of 475[2] EE studies. Based on co-citation[3] analysis, two well defined clusters emerge (Figure 1).

[2] References obtained in 5/8/2020 from the Web of Science database using the search string: TS=(entrepreneur* NEAR/0 ecosystem*) we only considered articles and reviews written in English language. For our analysis, we used VOSviewer software version 1.6.10, for a reference co-citation with a 40 co-citation threshold.

[3] When two documents are cited in the same article, a co-citation occurs, and thus it allows us to state that they are closely linked, the resulting clusters reveal the intellectual structure by mapping those strongly connected (Schildt et al., 2006).

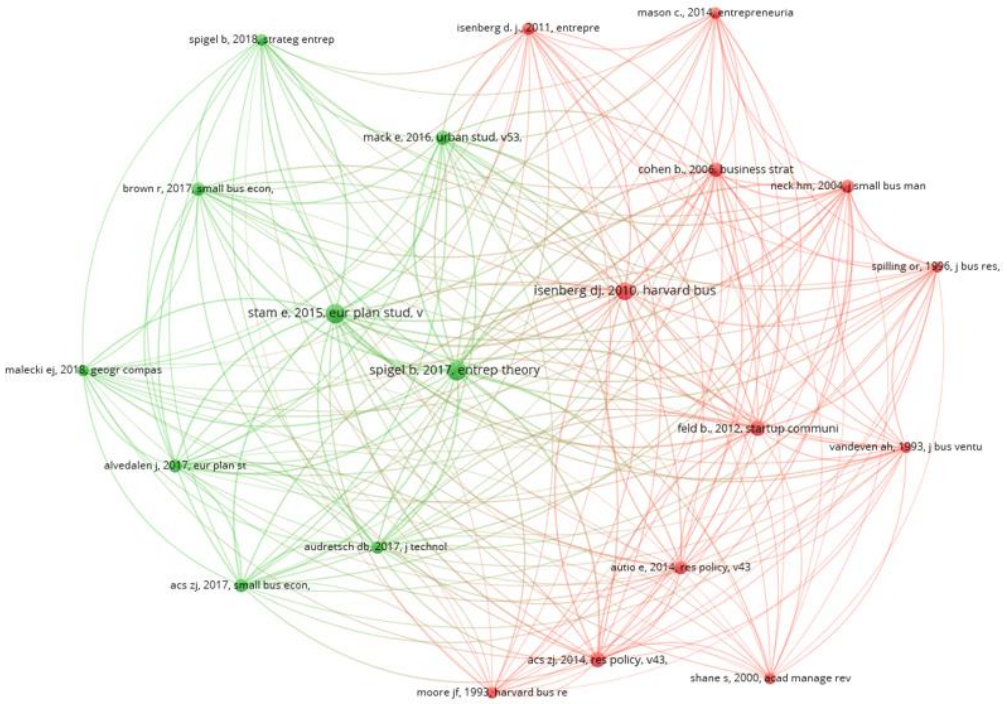

Figure 2-1 -Reference co-citation network (VOSviewer)

The first cluster gives us a clear view of the early development of EE research including references up to 2014: we underline a group of three articles (Moore, 1993), (Spilling, 1996) and (Van De Ven, 1993) that were relevant predecessors for the development of the concept. A second group (Cohen, 2006; Feld, 2012; Isenberg, 2010, 2011b), is commonly regarded as the field's seminal papers. Finally three references published in 2014, (Ács et al., 2014; Autio et al., 2014; Mason & Brown, 2014) despite different approaches, distinguish EEs from other concepts, representing an effort to differentiate and delineate space for the concept within entrepreneurship research.

The second cluster is constituted by more recent papers[4] (2015 to 2018) with an emphasis on reviewing and conceptual development. This suggests that research now has a sufficient critical mass for scholars to review and produce conceptual frameworks.

[4] (Stam, 2015), (Acs et al., 2017), (Alvedalen & Boschma, 2017), (Audretsch & Belitski, 2017) (Brown & Mason, 2017), (Stam & Spigel, 2017), (Malecki, 2018), (Spigel & Harrison, 2018)

Furthermore, in some papers[5] the need for delimiting the scope of the field distinguishing them from others, may indicate there is still no broad consensus on this topic and its main concepts, and suggests that the field has started a coherence seeking process, precisely the area where we expect to contribute.

A distinct connection with public policies is noticeable in both clusters, and to make our point we highlight just a few. For instance, Isenberg (2011b) emphasizes policy implications and the action of public leaders. Policy implications are also an important feature in (Ács et al., 2014; Autio et al., 2014; Mason & Brown, 2014). These scholars address the challenges for policymakers and policy intervention. Audretsch and Belitski (2017, p. 1030), offer support to 'policymakers and scholars in development of new policies'. Policy and the role of government are also key themes in Stam (2015) and in Brown and Mason (2017). Nevertheless, the challenges for an (eco)system policy are very different and more demanding than those addressed by the still prevalent and well-known framework policies (Autio & Levie, 2017), which are aimed at promoting entrepreneurship based on a market failure rationale (Brown & Mason, 2017; Mason & Brown, 2014). Consequently, there remains a need for frameworks and generalizable theoretically grounded insights regarding public policies and the role of government in EEs (Autio & Levie, 2017; Nordling, 2019; Spigel, 2017).

2.3 THE ROLE OF PUBLIC POLICY IN EE DEVELOPMENT

Given its promises for growth and regional development, the EE concept was born from a strong policy nexus (Cao & Shi, 2021), quickly attracting a great deal of attention within

[5] (Alvedalen & Boschma, 2017), (Spigel & Harrison, 2018)

policy circles (Alvedalen & Boschma, 2017; Autio et al., 2018) both in emerging and developed economy contexts (Isenberg, 2010). Its promotion is widely adopted as an objective by a growing number of different institutions, from local to supranational organizations, and at all levels of government (Brown & Mason, 2017). Consequently, this has resulted in a relocation of the policymaking focus from entrepreneurs and ventures to the development of EEs (Roundy, 2019a; Roundy et al., 2018).

The predominant belief in the potential of entrepreneurship as a positive response to economic problems (Nightingale & Coad, 2014), has fuelled a growing hope in the success of EEs as a path for achieving regional and economic development. This has then generated an increasing amount of public support in regions with different levels of economic growth, types of entrepreneurship, and institutional settings (Bruns et al., 2017). However designing public policies is still a challenging task that entails a complex equilibrium between different elements and stakeholders (Brown & Mason, 2017). In an EE, public and private sector actors interact in a symbiotic relation. Through public policies, government and regional authorities intervene to promote and shape entrepreneurial activity, acting upon economic institutions, that have an impact in fostering new business creation and long-run economic growth (Boudreaux et al., 2019). On the other hand, entrepreneurs benefit from public policy support, and are thus entrusted with the task of serving public purposes by contributing towards economic development (Klein et al., 2010).

The close link between EEs and public policy has its roots in the concept's regional development promise. EEs synthesize several preceding views, especially the focus on high growth firms, the regional or local focus, its specific context, and interaction with framework conditions (Mason & Brown, 2014), all in line with a wider and longer process of policy evolution. Since the 1980's, the policy focus on new venture creation arose from

a reliance on SMEs as the main source of job creation, and a boost to entrepreneurship research (Hechavarria & Ingram, 2014; Landström et al., 2012). A transition occurred following the financial crisis of 2008 (Brown et al., 2014) and the growing scepticism on the efficacy of SMEs policies not selective on their support, which is to say not specifically targeted at high-growth firms (Estrin et al., 2013; Isenberg, 2010). The EE approach emerged as a response to this new focus of public policy in increasing the number of high growth firms (Mason & Brown, 2014), uplifted by the progressively higher status of entrepreneurship in public policy (Motoyama & Knowlton, 2016).

For governments, supporting entrepreneurship is a complex endeavour, with policymakers acting upon macro and micro level institutional environments and dealing with multiple effects of policies (Estrin et al., 2013). It has been argued that policymakers can benefit from tools provided by management theory, essential for design and evaluation of effective public policy interventions (D'Aunno, 2005). Towards this endeavour, evidence-based knowledge can play a relevant role (Frese et al., 2014; Rauch et al., 2014) for both theoretical development and policymaking. Our work follows this line of reasoning. In particular, we seek to develop evidence-based theory to shed light on the unsettled issue of whether the government should act as the 'feeder' or the leader (Stam, 2015) of the ecosystem. The role of government public policy interventions plays out in two different policy-making approaches, set off by disparate views of the EE development process. A top-down, government led, artificial development process, and a bottom-up, self-regulated, natural evolution of the EE, led by an 'invisible hand' (Colombo et al., 2019). We hold that whatever the role, public policy interventions is fundamental and strongly impacts EE development, hence there is need to better understand the impact of such policies, the outcomes of EEs and how individual element outcomes impact the system (Autio et al., 2018) .

2.4 METHOD

Considering the aim of our work and the characteristics of current EE research, we focused on developing evidence-based knowledge by aggregating findings in extant qualitative studies, a systematic synthesis approach in entrepreneurship research suggested by Rauch, van Doorn, and Hulsink (2014). This is in line with suggestions made by Rousseau, Manning, and Denyer's (2008) who consider aggregative synthesis, as an effort to provide evidence of 'what works' by summarizing an overall effect, and in our case, the assessment of the effectiveness of public policy interventions. By comparing different qualitative studies we can clarify if a finding is consistent and replicable, offering a sounder foundation for developing theory or explanation (De Massis & Kotlar, 2014; Hoon, 2013) and simultaneously offer a base for future empirical testing.

The systematic synthesis of qualitative studies fits well with the aim of our research since it enables the examination of processes, and interpretation of complex and unique phenomenon embedded in different contexts, further addressing the interconnectedness of processes (Rauch et al., 2014). Hence, it is consistent with the characteristics of EEs and its processes, as a complex interconnected phenomenon, and effectively combines the aim of our research with the capacity to tap into the potential knowledge comprised in published EE qualitative evidence. Qualitative research synthesis has been used to integrate complex interventions, and particularly appropriate for studying processes because it focuses on identifying necessary and sufficient conditions for particular outcomes to be observed (Combs et al., 2019). It is also especially adequate for entrepreneurship research not only by allowing theories and hypothesis testing but also because it provides a deeper understanding of case studies (Rauch et al., 2014), providing researchers the capacity to understand the rationale of the underlying relationships (Eisenhardt, 1989). From a broader perspective, the approach is framed by the growing

momentum of qualitative methods in management literature, now holding a relevant place in top-tier journals (Bansal & Corley, 2011; Combs et al., 2019). In particular, the development of evidence-based knowledge, supports decisions and practice models in entrepreneurship (Rauch et al., 2014; van Burg & Romme, 2014).

2.4.1 Study selection

Following the recommendations for the systematic synthesis approach, we chose to apply a theoretical sampling strategy for the study's selection (Rauch et al., 2014). This type of sampling procedure is well aligned with the main aim of our research, more focused on building theory rather than in testing it. Thus the purpose of our theoretical sampling is to find qualitative studies that illuminate key characteristics of effective of public policy interventions (Eisenhardt & Graebner, 2007). As Eisenhardt Graebner and Sonenshein (2016) advocate, this type of sampling differs from random sampling since the purpose of the latter is selecting a sample that is representative and allows generalization to a population, while in theoretical sampling the "core interest is enabling meaningful comparisons that lead to better theory" (Eisenhardt et al., 2016, p. 1114).

Nevertheless, transparency is fundamental especially in qualitative research, based on a non-probabilistic sampling process (Aguinis et al., 2021) hence, in the following paragraphs is included a detailed description of all the steps and options of this process in the interest of transparency and the replicability of our sampling procedure.

After defining the type of sampling, the next step was the definition of the criteria for study inclusion/exclusion (Hoon, 2013). In this regard, our first concern was to ensure that we selected studies that have quality, and share enough in common to enable synthesis (Rauch et al., 2014). These two issues are paramount since the quality of the synthesis depends on the quality and homogeneity of the primary studies (Rousseau et

al., 2008). Selecting only published peer reviewed articles precludes the use of material that lacks scientific rigor, (Hoon, 2013). Therefore, to ensure the quality of the studies we selected our sample from the Web of Science database, this ensures a level of quality since the articles included in this database are all peer reviewed and the available sources are submitted to a validation process.

To guarantee the necessary homogeneity we decided to include only studies that specifically make use of the EE[6] concept. Any related conception was not included for two reasons: first, they do not explicitly consider the ecosystem viewpoint that is central to our research and hence may possibly represent a source of bias; second, as observed by Alvedalen and Boschma (2017), these concepts did not gain momentum and are found in older publications, hence having a minor influence.

Thus, we began with a broad search of published literature in the Web of Science database, this search[7] yielding 545 results. From the initial set we excluded all that were not published as articles (e.g. conference proceedings or book reviews), leading to 408 references remained. By adding a second search term ('case stud*') and a third (policy or policies), the initial set was refined to include only the references that explicitly mentioned case studies and are related to policy, in the title or abstract.

This process resulted in 35 references, and these were then analysed thoroughly and individually by the authors. Whenever the title and abstract were not absolutely clear, the reference was analysed in further detail in order to shed any remaining doubt by reading the entire paper independently. In the course of this analysis we applied a second criterion excluding all studies that were not qualitative case studies. This criterion is mandatory given the nature of our research, and the selected aggregative method (Hoon

[6] We decided to include in our search the variations of the words entrepreneurial and ecosystem since these naturally occur (e.g., entrepreneurial and entrepreneurship) and do not induce any deviation from the purpose of our study.
[7] For our initial search we used the following search term 'TS=(entrepreneur* NEAR/1 ecosystem*) AND LANGUAGE: (English)'

& Baluch, 2020; Rauch et al., 2014). Finally, studies that did not provide sufficient information on the development of public policy interventions to allow the analysis were obviously excluded. Thus, from the set of 35 studies, 31 references were excluded for the following reasons- 5 were not case studies, 6 had no relation to EE, and other 20 did not focus on EE development. Consequently, this process yielded in 4 references.

However, from our literature review and contact with other scholars of the field we were aware of two relevant and highly cited papers that fitted our criteria, despite not being part of the initial sample. This was not unforeseen, in fact it has been argued that in qualitative research the identification of studies is not as easy as in their quantitative counterpart (Rauch et al., 2014). Nevertheless, this presented a dilemma between derogating our systematic selection process or ignoring two relevant EE papers that fitted our criteria. We decided for their inclusion adding two more studies to our analysis. The first was Mack and Meyer (2016) who addressed the EE evolution perspective. The dynamic evolution process of EEs is very relevant for understanding the development of EEs(Alvedalen & Boschma, 2017). Thus, this study is valuable for our research. The second was Cohen's (2006) seminal paper on EEs. The latter was a less consensual choice, since it was written in the early stages of EE literature, however it may also be regarded as a way to observe the evolution of EE literature at that time.

Hence the final sample comprised of 6 studies. As observed by Lundberg and Öberg (2021) this number (4-10) of case studies is in line with the limits established by Eisenhardt's (1989) referential paper, and is also consistent with other research, for instance (Taura & Watkins, 2014).

We should bear in mind that in inductive approaches there is a trade-off between the depth of analysis and the number of studies included (Eisenhardt & Graebner, 2007). Furthermore, aggregative approaches are not about increasing the power of the analysis

through the expansion of the sample (Rauch et al., 2014), therefore a reduced number of studies is adequate for this type of approach. We therefore pursued a theoretical sampling strategy, with the aim of this type of sampling being to achieve in-depth understanding, and not a generalization from a sample (Eisenhardt et al., 2016; Patton, 1999). Thus, we focused our analysis on this small but diversified group of studies. This set of EEs (despite the relative geographical proximity of four of the ecosystems being located in the US and Canada) are very diversified in their contexts, sizes, and stage of evolution.

Ecosystem						
Location	**Finland – Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu.**	**USA - St. Louis**	**USA - Phoenix**	**Malta**	**Canada - Ontario**	**Canada – British Columbia - Victoria**
Area of activity	Not specific	Not specific	Not specific	Gaming industry	Not specific	Industrial ecology
Description	Large national development program delivered by the six biggest cities in Finland. The study illustrates how public policy may develop EE through regionally embedded actors	Analysis of the results and spillovers of a government sponsorship program in a city aiming at revitalization	An evolutionary framework of EE development, illuminating the interactions between elements and their impact in the development process.	A small island state through proximity of local actors successfully developed a gaming industry EE	This paper follows the experimentation over time of entrepreneurship support policies in Ontario	This study is a seminal work in EE literature, the author explores the components that contribute to the development of an EE.
Data	Interviews, qualitative surveys etc. /participatory action research (PAR)	semi-structured interviews	archival data and semi-structured interviews	semi-structured interviews	semi-structured confidential interviews	Narrative description

Studies	(Nordling, 2019) Public policy's role and capability in fostering the emergence and evolution of entrepreneurial ecosystems: A case of ecosystem-based policy in Finland	(Motoyama & Knowlton, 2016) From resource munificence to ecosystem integration: the case of government sponsorship in St. Louis.	(Mack & Mayer, 2016) The evolutionary dynamics of entrepreneurial ecosystems	(Yamamura & Lassalle, 2020) Proximities and the emergence of regional industry: evidence of the liability of smallness in Malta	(Bramwell et al., 2019) Growing entrepreneurial ecosystems	(Cohen, 2006) Sustainable Valley Entrepreneurial Ecosystems
Purpose	'The aim of this study is to explore public policy's role and capability in fostering the emergence and evolution of EEs. Specifically, it examines how platforms facilitate interaction and collaboration between ecosystem actors to support entrepreneurship and new business growth through innovation services'	'shed light on this depth and breadth of the effects of government sponsorship in the context of a larger local entrepreneurship environment and the process of how start-up firms cultivate their connections. More specifically, we conduct an in-depth case study of Arch Grants in St. Louis, Missouri, a government sponsorship that emerged out of a partnership by the public, private and non-profit sectors'	'To develop an evolutionary framework of EE development that integrates important components from prior work and describes how critical elements of an entrepreneurial system interact and evolve over time. '	'this paper operationalizes the different proximities types and conceptually investigates the different proximities between institutional actors in building a new regional industry, i.e. the gaming industry. The case of the Maltese gaming industry illustrates how regions with limited size and resource-scarcity, thus high proximities between actors (also prevalent in city-states and peripheral regions), can still defy the odds of the liability of smallness and, thus the proximity paradox'	'illustrate experimentation over time in Ontario, Canada with place-based innovation policies to support the development and coordination of entrepreneurial ecosystems on a regional basis across the province'	'this research explores how components of the formal and informal network, physical infrastructure and culture within a com- munity could contribute to a sustainable entrepreneurial ecosystem'

Table 2-1 - Case study profile

Not including this diversity of the characteristics is often referred to in EE literature as a limitation of studies (e.g. Stam 2015; Wurth, Stam, and Spigel 2021). The diversity of the characteristics of EEs in our set of studies enables a variance (heterogeneity) effect on the dimensions of interest in our study in the cross case analysis (Rauch et al., 2014; Suri, 2011). Furthermore, we also read thoroughly 67 articles in the EE literature, that provided us with important contextual dimensions as well as a more nuanced understanding of the phenomenon.

2.4.2 Study analysis

As suggested by Rauch, van Doorn, and Hulsink (2014) we applied a deductive strategy to examine the selected studies, focused on 'central organizing ideas'. From the vast range of public policy interventions, four characteristics stand out in the EE literature, the importance of public-private coordination; success examples; combining bottom-up with top-down approaches; and a holistic policy approach. Thus, based on our previous research and the aims of this paper, prior to the individual study analysis we developed a coding scheme.

Our first step was the analysis of the presence and impact of the above-mentioned characteristics of public policy interventions in each individual study. The impact was coded using four[8] levels. Each author coded the studies independently, and as an additional guarantee of the consistency and reliability of the analysis, an external (to the research team) coder was used to ensure the minimization of any possible bias. The results were compared and discussed until a complete consensus was reached.

[8] Coded levels: inexistent, low, moderate, and high.

One of the unsettled issues in EE research is the role of governments, whether they act as 'feeders' or 'leaders' in EE development, (Stam, 2015). In our analysis we coded government intervention along three levels (1) when governments had a low level of interference, not attempting to influence entrepreneurs on their choices or actively acting upon the course of the ecosystem development i.e., 'feeding' the ecosystem but respecting its natural, self-organized evolution. On the other extreme (3) we coded EEs where governments were clearly acting as the leader, actively directing its evolution, choosing the core business area, actively influencing entrepreneurs and new ventures. Level (2) represents intermediate situations.

Thus separate content analysis resulting from the coding process[9] was followed by a cross case analysis to achieve the study aggregation, and the results were graphically represented (Rauch et al., 2014). This representation allowed us to examine the relationships grounded in different contexts (Habersang et al., 2019) provided by different levels of government intervention and the characteristics of public policy interventions.

2.5 FINDINGS

Considering the primary objective of our research is to build evidence-based understanding of public policy interventions in EEs and thus contribute to the conceptual maturity of EE literature, we start by delving into published qualitative studies to search for relationship between the level of government intervention and the impact of public policies on EEs. Our findings emerge from the interaction between the content analysis of each study and extant theory. The data from which we derived our inferences are

[9] Detailed data is summarized in APPENDIX 1: Data analysis table

represented through a combination of demonstrative examples and tables (Sarkar, 2018). Next, we present our findings.

2.5.1 Public-private coordination

Finding 1: *The coordination between public and private sector effort, is effective as a type of public policy intervention for the development of EEs and their sustainability, for different levels of government intervention*.

Isenberg (2010) holds that EEs cannot be developed by governments alone, and suggests a coordination of efforts between public and private sectors, involving a significant share of private sector in the success of the ecosystem. Feld (2012) took a more extreme view, advising communities not to depend on governments to lead EEs.

Figure 2 represents the results of our analysis, concerning the relationship between the level of government intervention and the impact of public-private coordination in the development of the EEs. Our analysis indicates that the impact of public-private coordination is transversal to all EEs included in our study, and it does have at least a moderate level of impact. Thus, we hold that whatever the role government takes on, coordinating efforts with private sector is mandatory.

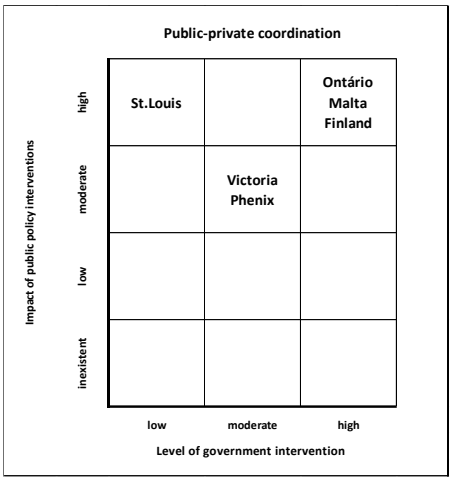

Figure 2-2 - Impact of public-private coordination in EE development

Both the Malta and St Louis cases [10] substantiate relevant public–private coordination. Especially in St. Louis, we found evidence of the 'intersection of private, public and semi-public organizations' and mixed funding (Motoyama & Knowlton, 2016, p. 455). One of the most important organizations for the development of the ecosystem, Arch Grants, 'emerged as a core component for promoting entrepreneurship, through partnership with a number of public and private organizations' (Motoyama & Knowlton, 2016, p. 453). This collaboration has another favourable effect as it enhances the relational validity of the Arch Grants award winners[11], since the organization is backed by public and private sectors, entrepreneurs benefit from the link between both sectors this organization represents (Motoyama & Knowlton, 2016). As for Malta, 'actively involving further actors, such as non-government entrepreneurial networks' is a clear trait, there are several examples of this effective coordination, (e.g. MCA (Malta Communication Authority) and Silicon Valletta), which in turn is favoured by the size of the population and the size of the island and the resulting proximity relations (Yamamura & Lassalle, 2020, p. 388).

[10] For ease of reading, hereinafter we drop the term "case", with the city name implying the case as well.
[11] Arch Grants promotes a contest every year, the winners receive a monetary prize and several support services.

In Ontario this cooperation is supported by a network of multi-stakeholder, regional development organizations, the innovation intermediaries, (Bramwell et al., 2019), and the cooperation between public and private stakeholders is central in this ecosystem and reflected in several programs. In Finland, the purpose of the program encompasses the simultaneous development of public services and entrepreneurial activities, this is an unusual option (Nordling, 2019), yet this policy option is based on previous smaller scale experiences. To implement an effective national public policy for entrepreneurial development both in private and public sectors, it is necessary to promote 'a complex environment of social networks, incentives, material support, and feedback' (Leyden, 2016, p. 554). In the Finnish ecosystem, there is also a broad account of coordination of public and private funding and mutual benefits in the platforms (Nordling, 2019). This national scale coordination of public and private funding, shares some similarities with a successfully implemented strategy for the development of innovation clusters in Germany (Audretsch, Lehmann, et al., 2019). As for the Victoria ecosystem, there are examples of this coordination especially in funding of the Sustainable Development Technology Canada (Cohen, 2006). Nevertheless these seem to be relevant to the EE, but are not systemic components. Phoenix had a previous account of public-private cooperation, especially since 2007, when as consequence to the decline in large companies, a 'coalition of public and private' organizations attempted to increase collaboration among existing cluster members, this was however not an effort directed at entrepreneurship and innovation (Mack & Mayer, 2016, p. 2125). In a more recent stage and despite the strengthening in public policies and support infrastructure, to create opportunities for entrepreneurs, and lacking a better level of coordination, further non-governmental efforts should also be committed to entrepreneurship thus contributing to the development of this ecosystem (Mack & Mayer, 2016).

Given the interconnected nature of EEs, developing networks is crucial, and public-private coordination is a good example of the importance of establishing these fundamental partnerships (Autio et al., 2014), our research found clear evidence of this in every study included in our analysis. Furthermore, effective coordination between public and private efforts contributes to the sustainability of the EE, that like in their biological counterparts, depends on an apparently contradictory balance between diversity and coherence of its elements (Roundy et al., 2017).

2.5.2 Combining bottom-up and top-down approaches.

Finding 2: *A combination of bottom-up and top-down approaches in public policy interventions is effective for the development of EEs, and is more relevant in EEs with high levels of government intervention. However, EEs led by bottom-up, private initiatives may also develop a diverse but relevant blend of bottom-up and top-down policy interventions.*

A combination of bottom-up and top-down approaches benefits the development process of EEs, the input and initiative of entrepreneurs and all the community is necessary (Mason & Brown, 2014). Our analysis reveals clear evidence of this blend in the EEs with higher level of government intervention. Malta shows a moderate level of impact however, with the smallness of this city-state and the proximity between EE actors attenuating the distance between top and bottom levels. In addition to the top-down policies aimed at improving the framework conditions for entrepreneurial activity, bottom-up approaches are also present in Malta, actively involving non-government entrepreneurial networks, the University and its incubator (Yamamura & Lassalle, 2020).

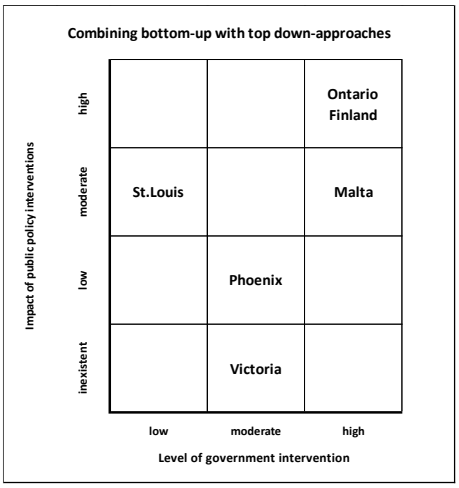

Figure 2-3 - Impact of combining bottom-up with top-down approaches in EE development

Literature suggests the existence of more bottom-up innovation methods and discretionary learning in Northern Europe public agencies (Arundel et al., 2015), this is consistent with the approach adopted in Finland. The development of the EE is based on platforms designed and implemented from the bottom-up. In fact, this 'bottom-up policy initiative builds on previous smaller scale attempts to develop platforms for ecosystems' (Nordling, 2019, p. 813). Nevertheless prior experiences showed the success of these platforms depended on a 'joint venture' between operational and strategic levels (Nordling, 2019), once more confirming the combination of both types of approach to EE development policy is vital for its growth and sustainability.

Ontario represents a clear example of this mix, described as a bit 'messy', hybrid combination of self-organizing networks (bottom-up) and top-down implemented policy (Bramwell et al., 2019), it is this mix that allows a continuous evolutions and adaptation of policy and the EE evolution itself. In St. Louis evidence of these approaches are also present, via the central role in the EE played by Arch Grants, a non-profit organization, founded by local business leaders, or the important coordination between support organizations or the role of entrepreneurial events 'organized by grassroots efforts' (Motoyama & Knowlton, 2016, p. 461). St. Louis is the 'outlier' of the set since it also

presents moderate level of impact combined with a low government intervention, though, in this ecosystem bottom-up approaches are predominant, and top-down less evidenced.

A blend of top-down and bottom-up approaches is vital for EE revitalization (Roundy, 2019c), accordingly the presence of more bottom-up approaches in the policy mix in Phoenix is described as necessary for the development of the 'missing components' (Mack & Mayer, 2016), and its deficit as an issue that restricted the growth of the ecosystem. Thus, Phoenix inversely evidences the importance of blending bottom-up and top-down policies.

In the seemingly dissonant case of St. Louis, we should consider that bottom-up initiatives are important and private sector led. Bottom-up approaches are missing or are not as significant in Phoenix and in Victoria, hence explaining the difference in the impact for the moderate government intervention EEs.

Hence, in brief, EEs evidencing a higher level of government intervention, and an emphasis on a more artificial creation view, are also those where bottom-up policies more relevantly combined with top-down.

2.5.3 Narratives of success.

Finding 3: *Public policy interventions by increasing the visibility of narratives of success, reduce the stress of venture creation and strengthen the legitimacy of the EE, resulting in the expansion of entrepreneurial activity and enhancing the chances of sustainability of the EE. However, to be effective, this type of public policy intervention must consider the evolutionary stage and the specific characteristics of the EE*.

Narratives that describe success stories have an important role in spurring entrepreneurial activity on and EE (Roundy, 2016). This type of narrative also evolves and plays different

roles depending upon the evolutionary stage of an EE (Roundy, 2019b), highlighting the possibility of gains, and soothing the perception of risks and obstacles these are a valuable policy instrument (Isenberg, 2010). Indeed these success narratives can have a significant impact on the development of entrepreneurial activity of an entire region (Motoyama et al., 2016; Roundy, 2019b). Therefore, in their efforts to develop EEs, policymakers should include and devise ways to highlight extant success examples to spark the growth and sustainability of entrepreneurial activity. In an early stage, these narratives of success are focused on individual stories. However, as the EE develops and the awareness and recognition of EE's role in the region's development, a critical mass of individual success stories gradually evolves to the development of narratives on the success of the EE (Roundy, 2019b).

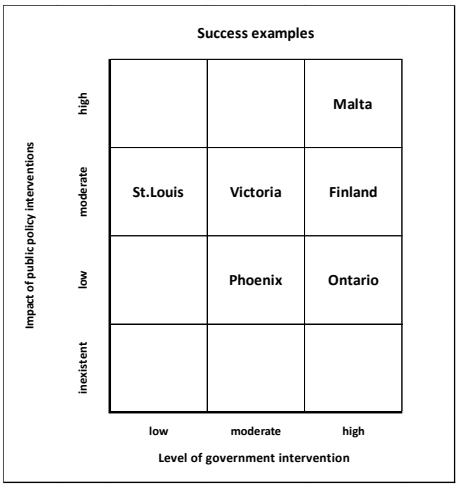

Figure 2-4 - Impact of success examples in EE development

In Malta, attracting internationally successful entrepreneurs as role models was a policy priority from the beginning. Several policies (e.g. favourable tax and licensing) were successfully adopted in order to attract 'foreign strong players' and international role models, these were the prime founders of the industry and played an important part in the development of an entrepreneurial mindset (Yamamura & Lassalle, 2020), thereby producing a high impact. Highlighting the presence of successful entrepreneurs is

characteristic of narratives in the early stages of an EE development (Roundy, 2019b) and a way to support the development of the ecosystem's identity and culture (Roundy, 2016).

On the other hand, in Phoenix the lack of success narratives negatively impacted the reputation of the ecosystem, one entrepreneur rating it as a third-tier market (Mack & Mayer, 2016). Isenberg (2010) explains how the visibility of potential gain of one, or few examples of success, can ignite the imagination and inspire many entrepreneurs and boost the development of the ecosystem labelling it as the 'law of small numbers'. It has been suggested that spill-over effects and major benefits can be obtained by only a handful of successful cases (Mason & Brown, 2014). In such reputational absence, entrepreneurs frequently left Phoenix unable to move up in the hierarchy of high technology EEs. For this reason, entrepreneurial recycling, and the critical mass necessary to self-sustain the cycle of spinoffs had not yet been reached (Mack & Mayer, 2016). EE's that fail to transmit success stories underperform (Roundy, 2019b). Accordingly, this was identified as one of the missing elements. Thus despite all the efforts to improve conditions for the development of entrepreneurial activity, the Phoenix ecosystem had not evolved from birth to the growth phase. To address this, it was suggested that policymakers should find creative ways to demonstrate that success is possible in this ecosystem by profiling successful entrepreneurs (Mack & Mayer, 2016), and thus use those success narratives to support the development of entrepreneurial activity and gradually diverting from the still influential but dated cluster discourse. In the early stages of the Ontario EE, there is reference to an effort by policymakers, modelled on the study of the 'best-in-class' (Bramwell et al., 2019). On the other hand there is also a reference to a failure of the Ontario Network of Entrepreneurs to support the growth of their high potential firms to a global scale and a struggle to balance between supporting winners and a more general

program solution (Bramwell et al., 2019). This was not a very significant feature in the Ontario EE and was coded as having a low impact.

The Finnish example has very particular characteristics, as a large national development program, public policy was aimed at inclusive and mutually beneficial approaches, and the program is developed though innovation services platforms (Nordling, 2019). Even in this ecosystem focused on openness, mutual value creation, and inclusiveness, success narratives play an important role. One of the platforms already self-sustainable and managed by a company, was 'repeatedly used as an example of a successful innovation service'. It was also observed that some of the less successful initiatives were not able to ensure a suitable level of participation or commitment (Nordling, 2019, p. 814). For this EE still in an initial development stage, individual success narratives were evidenced by examples of extant platforms that were successful in the past. This is consistent with the stage of evolution (Roundy, 2019b) and specific characteristics of an EE based on collaboration platforms.

In St. Louis, attracting entrepreneurs through a competition by itself, promoted the idea of success, the winners of the competition forming a 'cohort of entrepreneurs' with the prize granting them validity. Those who successfully survived a very competitive selection process were recognized by the community and had an easier access to resources and key individuals in the community (Motoyama & Knowlton, 2016). The policy designed towards the promotion of contacts between the winners of the prize was also important for learning process and for generating ties (Motoyama & Knowlton, 2016). This represents a deliberate effort at distributing a smaller prize to a larger group as a way of building a community of winners (Motoyama & Knowlton, 2016). This evidences a more mature EE, one where the importance of entrepreneurship and the positive impact of support organizations is already recognized by the community, and the ecosystem

narrative is now dominant pertaining to the ecosystem rather than individual successes (Roundy, 2019b) . Likewise in Victoria, the potential of its technology park and successful start-ups were showcased to attract more investment an leverage the reputation and capacity of the EE and its growth (Cohen, 2006). A few existing success stories were also taken as indicators of the ecosystems potential (Cohen, 2006), confirming these individual success narratives are associated with the early stages of an EE (Roundy, 2019b).

The evidence provided by the EEs in our analysis corroborates the important role played by the narratives of success. Highlighting these narratives, individual or collective, positively impacts entrepreneurial activity in an EE. We found evidence of diverse forms and different levels of impact in all EEs included in our analysis. Regardless of its evident relevance, there is not an unambiguous correspondence, between the level of government intervention and the impact of highlighting success narratives. Nevertheless, evidence from the selected studies supports a correlation with the evolution perspective, in line with what is described by Roundy (2019b). In the early stages of an EE, individual success narratives are predominant, such as the case of Malta, Victoria, or Finland. As the EE evolves, collective narratives emerge, and the focus becomes the ecosystem and its success story. Evidence of this latter transition is found in St. Louis, where the success of the ecosystem is recognized by the community and supplants the focus on individual narratives of success.

2.5.4 A holistic approach to EE development.

Finding 4: *Public policy interventions are evolving towards more holistic approaches. Furthermore, the success of EEs depends on the development of adequate*

systemic policies addressing all actors and stakeholders of the ecosystem, beyond the reach of traditional framework policies.

The development of a successful ecosystem requires a holistic approach, comprising of several types of policies addressing framework and systemic conditions (Cavallo et al., 2019), different actors and stakeholders of the EEs (Roundy, 2019c). Our analysis reveals a high or moderate influence of such holistic approach in the EEs with a higher level of government intervention, and a low impact where government has a moderate or low role.

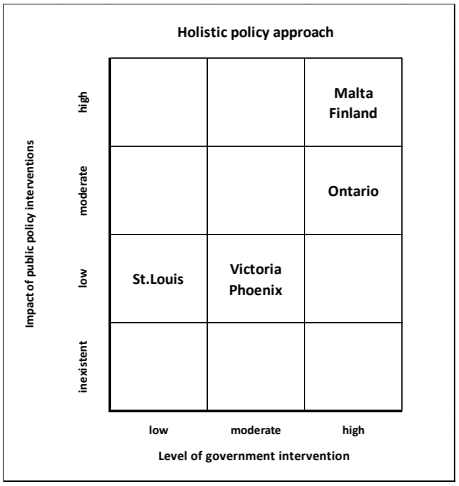

Figure 2-5 - Impact of a holistic approach in EE development

The Finnish government took a leading position, with a systemic perspective, acting upon networks, funding, and developing policy aimed at the development of a wide national scope EE. The scope of the policy interventions encompasses wide range of areas in Malta, from traditional tax and bureaucratic to the development systemic policies such as the development of a support network for investors composed of diverse institutional actors. A more vaguely guided policy effort characterizes the Ontario ecosystem (Bramwell et al., 2019). From the evolution of public policy interventions described in the study, this appears to be of one of the problems that hinders the results of public

policy. While not a very clearly holistic intervention, nevertheless there is a broad policy intervention.

A lower impact of a holistic approach is evidenced in the remaining EEs. In Phoenix for instance, policy still follows a traditional cluster approach focused on attracting and retaining entrepreneurs hindering the development process of the EE (Mack & Mayer, 2016). A narrower policy scope oriented towards private investment and return, is also present in St. Louis (Motoyama & Knowlton, 2016), and in Victoria where policy interventions are guided by a set of environmental issues (Cohen, 2006). This clear distinction is highlighted in the next section by presenting a condensed version of our findings organized according to this distinctive dimension of holistic vs traditional policy approach.

Policymakers are now more aware of the importance of a holistic approach to EE development (Audretsch & Belitski, 2017). It has also been argued that systemic policies, like network access and other intangible factors, are more relevant for entrepreneurs (Auerswald, 2015). This evolution is consistent with our findings since evidence of a holistic policy approaches increases in the most recent studies. There is also a clear relation between the level of intervention and the impact of the holistic policy approaches, higher levels of government intervention are matched by higher evidence of holistic policy approaches.

2.6 DISCUSSION

Our study was prompted by calls for the development of the conceptual maturity of EE research and the need to develop theory that improves our understanding of the effects of public policies in EEs (Brown et al., 2017; Stam, 2015). Our quest to develop further

understanding of the relation between the level of government intervention and the impact of public policy interventions on EEs, led us to examine the impact of public-private coordination; success narratives; combining bottom-up with top-down approaches; and developing a holistic policy approach.

Boosting growth is a crucial challenge for policy interventions in EEs, even when framework conditions are adequate (Mason & Brown, 2014). We hold that EE development must address all actors and stakeholders of the ecosystem, echoing previous calls (Mason & Brown, 2014; Roundy, 2019c), and comprise of several types of policies encompassing framework and systemic conditions (Cavallo et al., 2019). Our findings support the need to develop a balanced and customized mix of framework and systemic policies, and the relevance of a holistic view in public policy interventions aimed at EE development. Autio et al. (2014, p. 1106) provided an excellent synopsis of this, stating that a ‘ “context mix” requires a “policy mix” ’.

In the six qualitative studies in our analysis, we found unambiguous evidence, in different degrees, of coordination among public and private sectors. Based on our findings we hold that coordination of public and private efforts is essential for the development of EEs. This coordination is especially crucial in underdeveloped, peripheral regions, where the absence of prompt financial return restrains private investment (Bramwell et al., 2019). The profit driven logic of the private sector alone, may leave these regions out of the development path, thus public support policy is fundamental to balance otherwise insurmountable barriers for the development of EEs (Xu & Dobson, 2019). On the other hand, public sector alone will not be able to develop a sustainable ecosystem (Isenberg, 2010). Just as in nature, the resilience of the ecosystem depends on ‘balancing the seemingly paradoxical tension between the diversity and coherence of its components’(Roundy et al., 2017, p. 99). Effective coordination between public and

private efforts contributes to the preservation of this balance. Furthermore, evidence supports that public and private coordination is relevant even in EEs where the government has a less significant intervention.

Bottom-up and top-down approaches of EE development policies are closely associated with the two different perspectives of EE evolution. The first supports a more natural evolution process, while the second places emphasis on a further 'artificial' creation of EEs, led by government intervention (Colombo et al., 2019). The natural evolutionary perspective upholds a more limited role of top-down policy approaches, emphasizing a view of an EE as a dynamic, self-regulating network, with multiple actors and drivers (Isenberg, 2014). Bottom-up processes are also consistent with the current regional innovation and growth literature (Stam, 2015). The second and more interventive perspective underlines the role of public policy in creating framework conditions, positioning government or local authorities as relevant feeders of the system (Audretsch & Belitski, 2017; Colombo et al., 2019; Stam, 2015), hence advocating a more significant role of top-down approaches. Our analysis revealed that those EEs with higher levels of government intervention, also evidence a greater level of this combination of top-down and bottom-up approaches. This is consistent with the two distinct perspectives previously mentioned. The St. Louis EE is also a good example of the opposite perspective, featuring a more self-organized EE evolution where bottom-up initiatives are more relevant than the top-down government interventions. We hold that whatever the perspective or their relative weight, development of EEs requires a mix of both approaches, top-down for developing the adequate framework conditions are mandatory. However bottom-up initiatives, involving other levels of government as well as non-government actors, are essential for connecting different actors in the ecosystem (Mason & Brown, 2014). Our findings also confirm the duality of roles that public intervention

may follow, ranging from the 'ecologist' government that respects a natural evolution and upholds a bottom-up, self-organizing ecosystem to the 'creator' government that actively intervenes and shapes the ecosystem from a predominantly top-down perspective.

Narratives of success are important for the evolution of the EE and perform different roles along its development process. In the birth and growth of the EE, these narratives are crucial to feature successful entrepreneurs as role models (Malecki, 2018) and legitimize the ecosystems and new ventures (Kuratko et al., 2017). As Isenberg (2010) stated, in early moments of the ecosystem, visibility of even modest examples of success is relevant, emphasizing the possibility of gains, and attenuating the perception of risks and obstacles. A single success story may have an impact on an entire region (Roundy, 2019b). Further along the development of the ecosystem, prosperous firms may also become incubators for entrepreneurs (Mayer, 2013) and induce virtuous cycles of spinoffs, acting as agents of the entrepreneurial recycling process (Brown & Mason, 2017; Malecki, 2018). These individual success narratives are gradually incorporated in the region's mindset as the ecosystem coalesces (Roundy, 2019b). Hence highlighting the presence of blockbuster entrepreneurs, legitimizes the ecosystem and new ventures, within and beyond its limits and has a positive impact in entrepreneurial activity (Brown & Mason, 2017). Their active presence via reinvesting capital and/or experience in the ecosystem, signals an important source of capital and mentoring (Malecki, 2018). Narratives of success are relevant for all EEs. However, the way to highlight success must be adapted by policymakers to the specific conditions and stage of evolution of the EE. Our findings confirm this diversity. For instance, Victoria showcased success narratives of some key start-ups, and this was regarded as a strategy for attracting investment and entrepreneurs. A similar but more determined approach is present in Malta, where attracting international role models was critical to legitimize the ecosystem, creating an

entrepreneurial mindset to prompt a virtuous circle of entrepreneurial growth. As Roundy (2016) explains, accounts of their presence increase the perception of credibility for EE actors and therefore the legitimacy of the ecosystem both internally and externally. In Finland, the aim was to engage entrepreneurs in the development of the platforms, hence the narrative of success of one platform was highlighted. As for St. Louis, the problem lay not so much as in bringing large companies, but filling the void left by the departure of some of these. Therefore, demonstrating the success of new ventures was relevant. However, in this EE, an evolution towards an awareness of the ecosystem was already in place. The important role of organizations such as Arch Grants was widely recognized, and their success in converging efforts of the public and private sectors was deemed fundamental to the growth of the ecosystem. An EE and its successes became the dominant narrative and the lens through which stakeholders interpret the region's development (Roundy, 2019b). Conversely in Phoenix, not highlighting success was identified as one missing element for the completion of the entrepreneurial process, and thus demonstrating its importance.

Developing an ecosystem requires time, effort, and resources, combined in a unique fashion. There is only one Silicon Valley and no policy 'silver bullet' (Isenberg, 2011a). We found several examples in the EE literature (e.g. Denmark, The Netherlands or Phoenix) of significant public policy efforts that did not entirely reached a sustainable high growth of the EE, despite all the favourable framework conditions created (Mack & Mayer, 2016; Mason & Brown, 2014). These examples highlight the need for a broad scope of policies, covering several facets of the ecosystem.

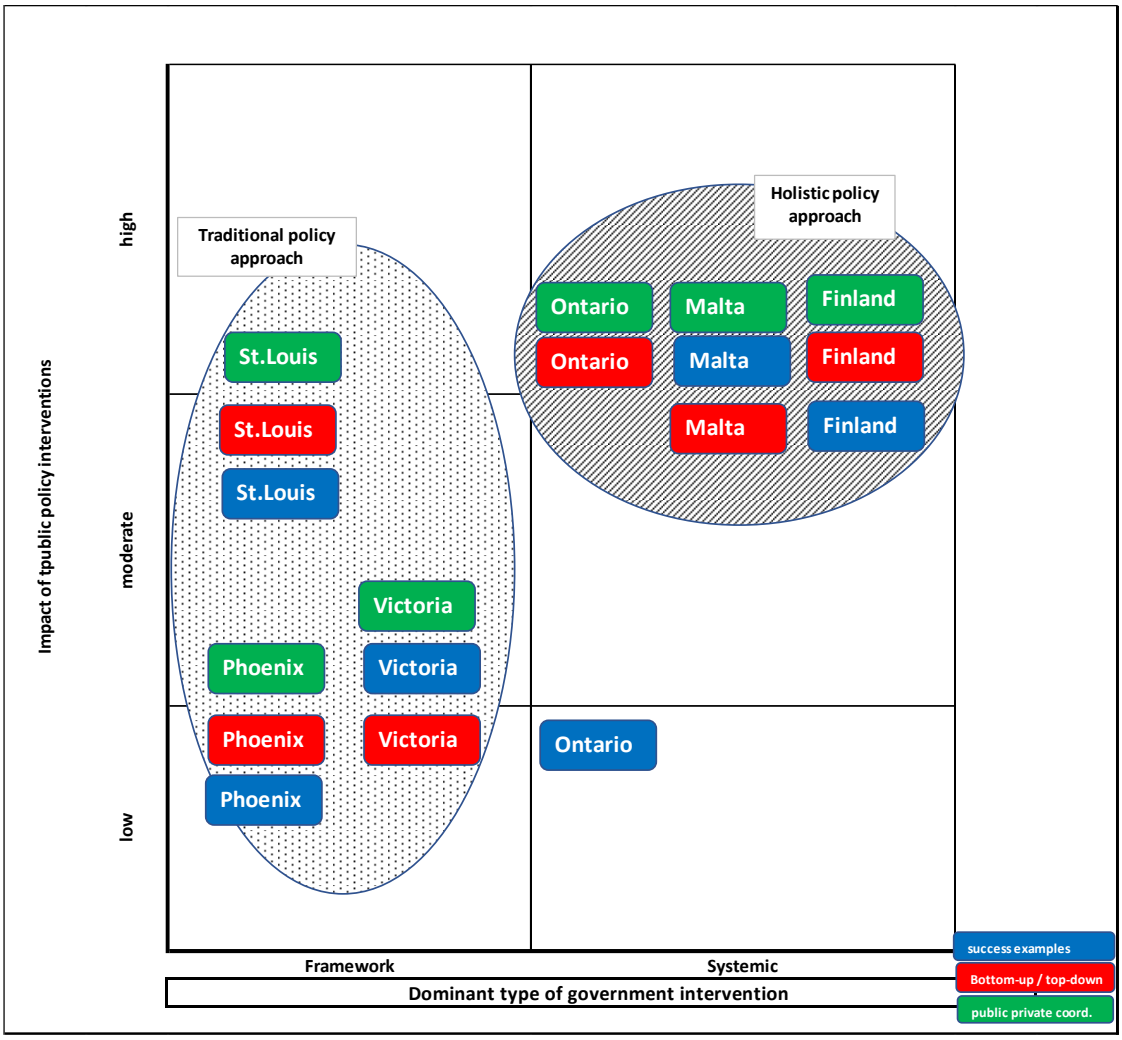

Figure 2-6 - - Traditional vs holistic policy approaches

The duality between framework and systemic nature that characterises EEs (Audretsch & Belitski, 2017) lead us to reorganize the results of our analysis according to the dominant type of government intervention, i.e., interventions focused on improving either framework or systemic conditions of the ecosystem, and evaluating their impact. Policy interventions dominated by more traditional framework policies evidence moderate or low impact, contrasting with the high impact of holistic approaches where systemic interventions are present and predominate (Figure 6). It is possible to differentiate between two groups, St. Louis, Phoenix and Victoria, with a more traditional approach and a lower impact of policy interventions. A holistic perspective backed by

systemic and more impactful policy interventions is present in the second group including Finland and Malta. Ontario also evidences a diverse set of policies with a focus on building networks, consistent with a systemic policy intervention. Thus, it was included in the second group, however, a strong holistic perspective is still lacking.

We distil the results of our systematic synthesis into a typology, making use of the distinctive capacity of typologies as a tool for theory building, namely the capacity to outline clearly identifiable 'ideal-types', and specify interconnections between them (Delbridge, 2013; Doty & Glick, 1994). In early development of a research field typologies are essential to provide the foundations for theory development, however typologies as defined by Doty and Glick's (1994) go beyond simple classification systems (Snow & Ketchen, 2014). Our typology is organized along two relevant dimensions (Doty & Glick, 1994; Post et al., 2020), the dominant[12] type of policy intervention, and the level of government intervention. The first dimension, tackles the dichotomy between policy interventions aimed at improving framework versus systemic conditions (Audretsch & Belitski, 2017; Stam, 2015). This dichotomy was empirically confirmed by the results of our systematic synthesis. The second dimension contemplates the contrast between a low level of government intervention, aligned with the self-regulated, natural evolution process perspective; versus the higher level of intervention characteristic of the government led, artificial development perspective (Colombo et al., 2019). Our results also suggest an empirical corroboration of this duality.

The typology encompasses four 'ideal-types' of intervention (Doty & Glick, 1994). These types help clarify our results, representing 'theoretical prototypes' (Habersang et

[12] Following Doty and Glick's (1994) definition of a typology, the ideal-types are not mutually exclusive, distinguishing typologies from classification systems. In the same line of reasoning, we labelled this dimension 'Dominant type of policy intervention' signalling each type may allow minor interventions from its counterpart.

al., 2019; Helkkula et al., 2018, p. 285) that emerge from a unique and interrelated combination of attributes, that in turn determine an output (Doty & Glick, 1994). Additionally, our typology encompasses a diversity of options and differentiable development paths governments may support, this is essential regarding the diversity of ecosystems' characteristics but also to incorporate a range of policy options.

We termed the ideal-types as the *ecologist*, the *creator* the *promoter* and the *landscaper*. They encapsulate very distinct views of how entrepreneurial activity expands within an ecosystem and consequently the role public sector interventions play in the process of EE development. Naturally, each one of these combinations of attributes will necessarily determine a different outcome (Doty & Glick, 1994).

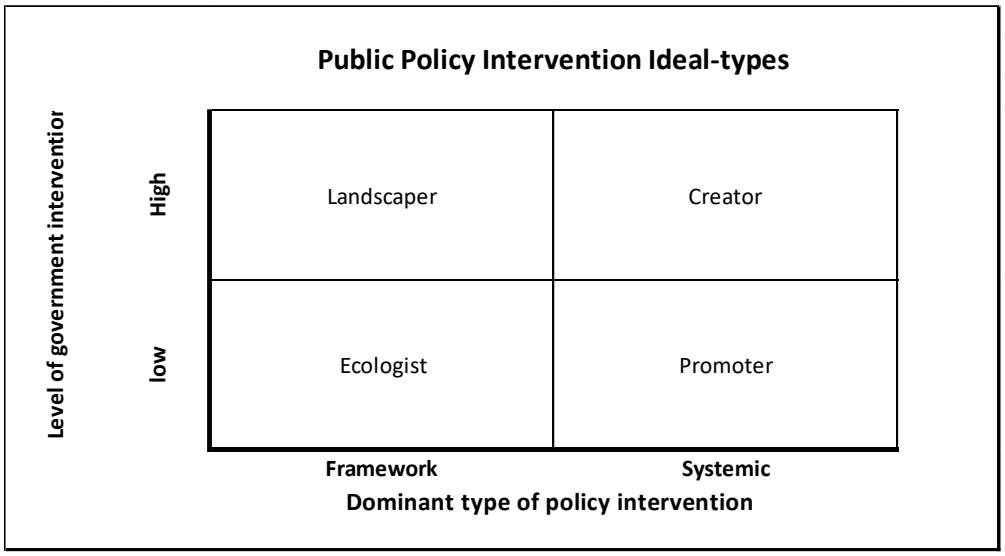

Figure 2-7 - Typology of public policy intervention ideal-types

The *ecologist* upholds a less intrusive policy action and a belief in a self-organizing ecosystem, where any disturbance may harm the natural equilibrium. Consequently, this supports a more restricted role for policy intervention (Colombo et al., 2019) and the parsimonious sponsorship of traditional framework policies. This restricted level of intervention leaves the development of the ecosystem in the hands of a self-regulated,

natural evolution process. Thus, the expected output of policy interventions will also be limited.

On the other hand, the *creator*, looks at the EE as an artificial system that should and must be managed, thus endorsing a significant role for public policy intervention. Actively managing the ecosystem, the *creator* is aware of the systemic nature of the EE and the importance of networks and interactions between different ecosystem actors (Stam, 2015). Hence, systemic policies typify policy interventions. The higher level of intervention and the belief in their relevance, suggest the prospect of more significant results, namely the sustainable growth of the EE and entrepreneurial activity via the development of networks and improved interconnection between EE elements.

The two ideal-types above correspond to the more contrasting options for public policy interventions. However, our typology suggests the possibility of adopting intermediate approaches for public policy interventions that may also prove useful for EE development.

A high level of government intervention could focus primarily on framework policies, where the emphasis would rest on improving the 'ground'. Hence, we label it as *landscaper*. This path would be nearer to a more traditional cluster policy, therefore not fully suitable for developing EEs. However, under specific circumstances and for a limited time period, e.g. in the early stages of EE development in a resource-scarce context (Cao & Shi, 2021), a strong policy intervention focused on providing the appropriate resources may prove effective (Brown & Mason, 2017; Mack & Mayer, 2016). The outcome of this type of option will be an increase of entrepreneurial activity resulting from the increased availability of resources.

By contrast, a systemically focused policy combined with a low level of government intervention, could also be effective for EE development. The result would be a soft

version of the creator, we designate as the *promoter*. Here the focus is on developing/promoting existent networks and institutions with a lower level of intervention. This type of intervention with a focus on systemic policies, more characteristic of the EE concept, is simultaneously more compatible with the less intrusive policy action advocated by those who believe in the natural, self-organized EE. It may also be adequate for an EE that, given the abundance of resources and favourable characteristics, does not require a more substantial type of intervention.

These four different ideal-types distil the options for public policy interventions in EEs. However an EE is dynamic, and there is no 'one size that fits all' solutions (Brown & Mason, 2017). Supporting EE development imply adapting to the context and its evolutionary path (Mack & Mayer, 2016). Each EE is unique in its characteristics (Isenberg, 2010), its evolutionary process is also unique, and policy interventions must adapt to this EE's singular nature. The typology clarifies the set of available options, bearing in mind the characteristics of the ecosystem, the degree of intervention and implicitly the expected results. To illustrate our point, for an EE in an early development stage, policy interventions may develop according to the creator ideal-type, focusing on systemic policies and involving a high level of government intervention. Alternatively, governments may choose to invest heavily on reinforcing the availability of resources. This type of intervention is characteristic of a landscaper an ideal-type, evolving only in a subsequent stage to a creator. Alternatively, the choice may be to always keep a low level of intervention as represented by either the ecologist or the promoter ideal-types. This choice may result from a policy option, founded on the belief in the natural, self-organizing nature of EEs or the abundance of available resources. In short, there are different ways to develop an EE and governments may choose between different types of

policy interventions. Moreover, the ecosystem is dynamic and evolves, thus, public policy interventions must also adapt and evolve over time.

2.7 CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH OPPORTUNITIES

Entrepreneurship is recognized as a crucial source of job creation and economic growth (Bradley & Klein, 2016), and the entrepreneurship phenomenon is currently acknowledged as an emergent and well-established scholarly field (Fayolle et al., 2016). The EE approach has received growing attention from policymakers, scholars, and a variety of social actors, gaining prominence in the dynamic research field of entrepreneurship.

The EE concept offers a solution for the dearth of a truly systemic perspective, pointed out as a frailty in the sizeable entrepreneurship research, more focused on the role of entrepreneurship in regional and economic development (Alvedalen & Boschma, 2017). Nevertheless, the concept is still under-theorized (Autio et al., 2018), and lacking answers to essential theoretical and empirical issues. This is also the case for the role of public policy in EEs (Nordling, 2019; Stam, 2015). Our work provides three key contributions.

First, our research offers insights towards a clearer perspective of public policy interventions regarding the development of EEs. By synthesizing information from qualitative studies, we contribute towards the advancement of research and theory development. It has been argued that in emergent management domains validating theory from empirical articles is common and adequate (Colquitt & Zapata-Phelan, 2007).Furthermore by intersecting theoretical and empirical knowledge it is possible to

develop practice-oriented ideal-types and support future empirical testing (Lindgreen et al., 2021).

We followed this path, by grounding our findings in a rich and often underexplored resource, provided by the analysis of published qualitative studies. Responding to requests for the advancement of evidence-based knowledge (Aguinis, Ramani, and Alabduljader 2018), our study also contributes to improving the still limited evidence base in EE research (Alvedalen and Boschma, 2017; Stam, 2015).

Following our research strategy, we are able to provide evidence-based support to the validity of several assertions present in previous studies. Our findings give credence to the duality of the 'natural' versus 'artificial' perspectives of EE development, observed in the literature (Colombo et al., 2019; Stam, 2015). Additionally, the chronology of the set of studies included in our analysis also suggests a corroboration to the notion that more systemic and holistic approaches in EE policymaking are now gradually in place (Audretsch & Belitski, 2017; Hechavarria & Ingram, 2014; Mason & Brown, 2014). Finally, we produce evidence inaccessible by quantitative approaches, demonstrating the adequacy of the systematic synthesis of qualitative studies (Rauch et al., 2014).

Second, we offer a typology comprised of four ideal-types of public policy interventions. The typology is derived from the identification of recurrent patterns across the examined studies and the comprehensive perspective that the results from the systematic synthesis provide (Hoon, 2013; Rauch et al., 2014). The ideal-types result from the intersection of the two dimensions of the typology; the dominant type of policy and the level of public intervention and are labelled the *ecologist*, the *creator*, the *promoter*, and the *landscaper*.

Our theoretical framework provided by the typology and the ideal-types has a threefold relevance for our study and EE research. First they help to resolve contradictory

and seemingly conflicting perspectives in literature (Greenwood & Hinings, 1993; Habersang et al., 2019). For EEs, they allow the natural versus artificial perspectives to be explained and integrated in a single framework, that organizes and posits the two perspectives not as conflicting or contradictory but as part of a structured set of policymaking options. Furthermore, from the dimensions the typology we unveil two intermediate types of policy intervention that complement and add to the options and the array of available choices. Thus, our framework improves the coherence of the field and harmonizes current theoretical and empirical EE research. Second, we offer a framework for identifying the current dominant type of public policy intervention, study its evolution path and alternative choices for future development. This dimension is crucial, given the undeniable relevance of the EE evolution cycle and the necessary adjustments for EE policy interventions (Mack & Mayer, 2016). Additionally, the framework provides a perspective on the range of evolution itineraries that governments, via policy interventions, may support. Finally, our typology provides a tool for future theory testing, supported by empirical evidence, deemed fundamental for developing robust models and theories in management (Colquitt & Zapata-Phelan, 2007). Our study also sets a basis for future research, especially related to the evolution process, and drawing attention to areas that have been overlooked.

Third, our findings provide practical and evidence-based advice for practitioners and policymakers, by taking stock from extant literature to identify relevant evidence for EE practice (Frese et al., 2014; Jaakkola, 2020). For practitioners, the way policy interventions affect EE development has been hazy. Each ecosystem is unique, and therefore there is no one size fits all solution (Brown & Mason, 2017). The mix of policies must consider the specific characteristics of the ecosystem, and also the stage of the EE's evolutionary cycle, adjusting the policy framework and system focus. Effectiveness of

public policies concerning EE development may be enhanced by acknowledging the relevance and impact of these elements in their design. Typologies are a valuable instrument for practitioners (Delbridge, 2013). Typologies provide a language to explain the hazy nature of a subject, by translating it into a coherent set of types (Cornelissen, 2017). By offering a typology, that condenses into four ideal-types the options for public policy interventions, according to the dominant type of policy focus and level of intervention, we provide a basis for decision-making, grounded on evidence from current evidence. This adds an instrument to the EE development toolkit, by converting theoretical discussions into actionable knowledge. However, the choice of the type of policy intervention should not be regarded as static or definitive, it must match the ecosystem's dynamic nature, adapting and evolving along with the EE. It has also been argued that to be successfully implemented, the value of the policy intervention should be easy to perceive (Nordling, 2019). Thus, by shedding light on the effect of public policies and converting it into actionable advice, we contribute not only for policymaking but also in general for the development of EEs.

Our study is based on a qualitative, exploratory research method. While certain limitations need to be pointed out for the use of a qualitative methodology, we believe that the richness of the grasp of complex processes clearly outweighs the disadvantages. The set of examined qualitative studies provide rich information on several facets of the EEs. However other information is not available such as the number or quality of new ventures. This is a limitation, which also suggests an interesting future research path. We also acknowledge that some of our results may be related to the specific economic and cultural contexts of the six EEs, considering all EEs in our sample are situated in western developed countries and especially since four are located in US and Canada. Further studies which also include developing and emergent economies, should prove to be a

productive research path. However, these contexts have merited less attention from entrepreneurship scholars, and such studies represent an additional challenge. We also acknowledge that one of the six studies (Cohen, 2006) included in our analysis, predates all the others, and the research field has grown considerably since then. Despite being a seminal paper in the EE literature, its inclusion may be regarded as a limitation. Lists of EE key factors, have been criticized for lacking clear evidence base and causality link (Alvedalen & Boschma, 2017; Stam, 2015), our approach diverged by grounding our findings in real cases. Testing and validating our findings and theoretical framework on additional EEs may also constitute a base for future research, as well as exploring further connections to other research fields[13].

[13] EE researchers share an interest on the role of the external business environment with regional development research (Acs et al., 2017; Stam & Spigel, 2017) and coordination and value appropriation with strategy scholars e.g. (Adner, 2017; Iansiti & Levien, 2004).

APPENDIX 1: Data analysis table

Ecosystem						
Location	**EU - Finland – Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu.**	**USA - St. Louis**	**USA - Phoenix**	**EU - Malta**	**Canada - Ontario**	**Canada – British Columbia – Victoria**
Role of government	**3 – high** This is government led process, representing a substantial investment. 'Findings illustrate that public policy may incubate and facilitate entrepreneurial ecosystems through regionally embedded actors.'	**1- low** Many efforts are not from government initiative, these are in part 'spearheaded by a handful of local businessmen and community leaders'. The development of the EE is not 'in alignment with a broader, public scope at the regional level'.	**2- moderate** Although government has developed several crucial policy interventions these still lack the scale and influence to boost the emerging EE to a sustainable development. The role of government in a 'lower-tier ecosystem' has an enhanced importance.	**3 – high.** The government actively influences the EE creation and development, selecting and supporting a specific activity. 'Ministries and governmental agencies **prioritize** the development of the gaming industry by **actively** designing favourable regulatory	**3 – high.** The government actively influences the EE development process, even if detaching from the initial sector selective EE approach, the relevance of public policy interventions is clear in the constant effort for adaptation, expansion of scope, diversity of support programs and broad service range provided.	**2- moderate.** The government selected the area of activity and developed an important incubator through university but otherwise let the EE naturally evolve (programs are very generally oriented towards industrial ecology). 'With respect to Victoria, perhaps **most important** is the fact that the **federal government** ratified the Kyoto protocol in December 2002.'

	‘a very large national development programme (worth 100 million Euros in total) (…) incubating EEs both at the regional and national levels.’ ‘the programme is the first **large-scale policy** attempt to implement ecosystem-based policy both on regional and national levels.’ ‘all were initially injected by public funding,’	Thus, the role of government is relevant but not the focus of the EE development process.	‘In terms of **government-based efforts** to support research, three **major milestones** characterise the first decade of the 21st century.’ ‘that Phoenix is on the move in terms of its entrepreneurial ecosystem development (…) Interviews also revealed that these development efforts are being driven by **government programmes**, incubation facilities and university-based programmes.’	frameworks and conditions, and encouraging the creation of new ventures.’ ‘support incentives provided by Maltese institutional actors and networks are crucial in establishing enterprises’	The interventions are also wide in their duration, now over 2 decades. ‘Network of Entrepreneurs (ONE) program is a **publicly funded network** of intermediaries **mandated** to facilitate technology transfer, commercialization of research and knowledge-based entrepreneurship on a regional basis across the province of Ontario.	

Public policy interventions						
Success examples	**2- moderate** 'repeatedly used as an example of a successful innovation service' 'The Strategy is based on three larger **spearhead projects**: open innovation platforms, open data and interfaces, and open participation and customership whilst several pilot projects complement these focus points – all contributing to the overall goal of ecosystem development and growth.'	**2- moderate** 'One crucial pilar of this EE is the selection of 'winners', thus success in the Arch Grant competition is highlighted to promote the EE, nevertheless these are only potential future success' 'winners, creating a cohort of entrepreneurs'	**1- low** 'there are **few visible** serial entrepreneurs and **success stories** in the region' 'There are **few success stories** because there are few firm births and the regional culture is not risk-oriented and conducive to new ventures.' 'missing components include local success stories' 'In terms of success stories, policy-makers and economic	**3 - high** 'And we understand that even the ecosystem itself, if it is going to grow; it needs to **grow first from a number of start-ups** here.' 'attracting 'foreign strong players' (GA06) and international **role models** along with local potential entrepreneurs and investors to develop an entrepreneurial mindset in Malta.'	**1-low** 'revise the policy approach based on feedback both from practitioners in the field and the study of '**best-in-class** models for innovation in Ontario'' 'Most notably, it **has failed** to address the key challenge facing Ontario's high potential growth firms – the need to grow to global scale.'	**2- moderate** The 'technology park in Victoria, VITP, seeks to **showcase** British Columbia and Victoria as a place for start- up technology firms. The park is also home to several life science and biotechnology start-ups including Aspreva Pharmaceuticals Corporation, which raised $76 million in venture capital in early 2004 to develop clinical trials throughout the world to fight lupus and several skin disorders. **It is hoped that this investment will attract more investors to the area**.'

			development entities might think of creative ways to profile successful entrepreneurs in the metropolitan area to highlight that success is possible in Phoenix.'			'depicts a few of the local success stories. While not conclusive, **the success** of these and other young growing firms suggests that Victoria may have the 'makings to **leverage** its SEE components towards a leadership position within Canada as 'the place' to start a sustainable venture.' 'longitudinal research could examine the role that **reputation** for sustainability plays in attracting employees and sustainable entrepreneurs to the community.

Public-private coordination	**3 - high** 'examples that were deemed as useful for developing the local EE through interaction and collaboration through different ecosystem actors' 'Funding for the model comes from local universities, cities and companies (as customers) as it benefits comes from local universities, cities and companies (as customers) as it benefits them all.' 'an innovation service offered by **a city governmen**t to facilitate interaction and collaboration between **companies** and	**3 - high** 'public and private sectors started to form **coordinated efforts** during this period. STL Venture Works and Accelerate STL are two mainly public initiatives' 'the nature of the **public–private partnership** with Arch Grants enhanced the coordination among the local support organizations' 'the Arch Grants emerged as a core component for promoting entrepreneurship, through **partnership with a number of public and private organization**s'	**2 -moderate** Although the coordination is evidenced in several ways the impact is limited. 'a coalition of public and private organisations charged with economic development' 'Support and policy efforts should also focus on greater coordination amongst EE components and actors.'	**3 - high** 'To promote entrepreneurship in the country these institutional actors (GA) encourage the development of a knowledge network and an EE by **actively involving further actors**, such as non-government entrepreneurial networks (EN) as the University of Malta and its incubator.'	**3 - high** 'network of 11 innovation intermediaries. (…) multi-stakeholder, regional development organizations' established with the vague directive to 'support partnerships **among business, institutions and local governments to promote innovation**' (Ontario Ministry of Finance, 2005, p. 110)[2]. As evidence of the government's support for the commercialization activities of RINs and other OCN organizations, a suite of funding programs was established which were cumulatively valued at **$63m** for the	**2 -moderate** 'In fact, the SDTC has taken that approach as **private organizations** have contributed funding which **surpassed the public funding** levels.' 'A final example of innovative **partnering** with government agencies relates to a partnership between the City of Victoria, a local landfill and a **private company**, Maxim Power, to capture methane gas from the waste in the landfill and convert it into electricity to be purchased by the provincial utility company (BC Hydro).'

	comprehensive **schools** with the support of a digital platform 'both schools and companies can initiate a collaborative project' 'The facilitation of the service is run by the hospital's special unit and it is offered as a chargeable service for companies.'	'**vibrant collaboration and coordination** amongst and between entrepreneurial support organizations and entrepreneurs'			2008–2009 fiscal year (Hepburn, 2013).'	

Combining bottom-up with top- down approaches	**3- high** **"**in order for the platform to be "successful", the platform should be a **joint venture** between the **operationa**l and **strategic** level (decision-makers) actors." "Facilitate collaboration and interaction of EE actors through innovation services, in which entrepreneurs are connected to regional – or even national or international – resources (infrastructure, competencies, data, etc.) in the spirit of co-creation." "This **bottom-up policy initiative** builds on previous smaller scale attempts to develop	**2-moderate** There are mostly indirect references, nevertheless in this case bottom-up approaches are predominant, and top-down less evidenced. "major catalyst of the growth spurt in the early 2000s was an effort spearheaded by a handful of local businessmen and community leaders(…)recent research has found **vibrant collaboration and coordination** amongst and between entrepreneurial support organizations and entrepreneurs to be highly beneficial" "providing a bridge between the public and	**1- low** "The development of these elements will likely require a blend of more grassroots strategies with current top-down approaches. "	**2-moderate** "turning size to an advantage through strong **collaborative action** and institutional adaptability" The smallness of this city-state and the "smallness and proximity between actors" attenuates the distance between top and bottom levels.	**3- high** – "policy adaptation to support ecosystem development in Ontario is neither driven entirely "top-down" by macro-institutional policymakers nor "bottom-up" by regional ecosystem actors, but is rather a somewhat "messy," multi-dimensional, and variable "**hybrid" blend o**f the two (Uyarra and Flanagan, 2016; Bradford and Bramwell, 2016)" "multi-level interactions between provincial policymakers and community-based practitioners involved in commercialization and entrepreneurship confirm that innovation	**1- low** Not relevant or not described.

	platforms for ecosystems.”	private sectors, Arch Grants aided in connecting its recipients **to other entrepreneurship support organizations**”			ecosystem policy **is neither entirely “top-down,” enforced by state dictate, nor “bottom-up**,” driven by self-organizing local networks, but rather a somewhat “messy,” multi-dimensional, and variable “hybrid” blend of the two (Flanagan et al., 2011; Autio et al., 2014)	

Holistic policy approach	**3- high** The approach has a wide/national scope, and a systemic perspective acting upon networks. The platforms focused on "co-creation and collaboration in innovation platforms to reach a **wide social and economic renewa**l" "six biggest cities come together to develop public services and entrepreneurial activities together to create a national network of services to better serve both the public service development and entrepreneurial growth."	**1- low** "this intersection of private, public and semi-public organizations suggests that the goal of sponsorship should be beyond private investment and return, and in alignment with a broader, public scope at the regional level."	**1- low** "However, economic development policy remains oriented towards **traditional strategies** such as clusters and firm attraction and retention." "the government support offered is oriented towards **classic growth machine strategies** including image marketing, cost advantages and low regulatory hurdles" "the influence of **policies** and initiatives on high-tech and life sciences startups." "At the turn of the century, several changes took place within the metropolitan area that	**3- high** The scope of the policy interventions encompasses wide range of areas from traditional tax and bureaucratic to the development systemic policies such as the development of a support network for investors composed by diverse institutional actors.	**2-moderate** – From the evolution of public policy interventions described in the study this appears to be of one of the problems that hinders the results of public policy. There is not a clear organized holistic intervention, though there is a broad policy intervention. "network of 11 innovation intermediaries. …."multi-stakeholder, regional development organizations"	**1- low –** Programs and strategies are focused predominantly on a set environmental driven policy interventions, lacking a pronounced holistic character.

			would strengthen higher education institutions in the area, as well as **government- based efforts** to support research.”		established with the **vague directive**”	

Tabela 2-2 - Data analysis table

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CHAPTER 3

ENTREPRENEURIAL ECOSYSTEMS POLICY FORMULATION: A CONCEPTUAL FRAMEWORK.

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Abstract

Encouraged by the ubiquitous belief in the value of entrepreneurship as a source of economic growth, the development of entrepreneurial ecosystems represents a leading drift in entrepreneurship policy and is part of the development strategies of many countries and regions across the globe. Policy and entrepreneurship are symbiotically interconnected, where research plays an important role in providing policymakers valuable insights. However, the study of entrepreneurial ecosystems is recent, undertheorized, and fragmented. It has a limited capacity to explain the effect of entrepreneurship policies, while competing views of how to develop an entrepreneurial

ecosystem coexist. Without solid and coherent theoretical foundations to guide its formulation, policies risk being ineffective. This study aims to provide guidance on key parameters to inform the formulation of entrepreneurial ecosystem policies. The development of entrepreneurial ecosystems requires a customized mix of policies adapted to the unique characteristics of each ecosystem; promote the quality of entrepreneurship to ensure allocation of resources to productive use; and address the complexity of entrepreneurial ecosystems with a holistic policy approach. Based on our findings we present a conceptual framework and discuss three parameters for policy formulation: top-down versus bottom-up, support to systemic versus framework conditions, and holistic versus siloed approaches.

Keywords: entrepreneurial ecosystems; entrepreneurship policy; policy formulation

3.1 INTRODUCTION

A generalized belief in entrepreneurship as a key driver for economic growth and regional development, has prompted policymakers to seek effective ways to harness the potential benefits of entrepreneurial activity for the development of regions and countries (Audretsch & Belitski, 2021). Policy and entrepreneurship are symbiotically interconnected, where research can play an important role in providing policymakers with valuable insights for entrepreneurship policy formulation (Zahra & Wright, 2011). However, the relevance of policy, for promoting entrepreneurship and entrepreneurial ecosystems (EE) has not been accompanied by theory, even when EE's development constitutes a leading drift in entrepreneurship policy for the past decade (Roundy, 2019a), fueled by pledges of prosperity and growth and examples of the impact of successful EEs (Pahnke & Welter, 2019). EE policies play a relevant role in shaping EEs for the development of new ventures (Spigel, 2017), acknowledged even by those who downplay the role of government (Stam, 2015). Thus, understanding what ignites the expansion of entrepreneurial activity is key for policy formulation, especially in underdeveloped regions (Fritsch et al., 2019). EE literature upholds the widely accepted link between entrepreneurship and the development of a region, as well as a promise to clarify the role of the context and the ensuing policy implications (Content et al., 2020). This has granted the EE concept a rise in attention being particularly visible in entrepreneurship policy[14] and practitioner communities (Audretsch et al., 2018; Spigel & Harrison, 2018).

However, despite the keen interest among academics and policymakers, it is still not completely clear how public policy may promote the emergence of EE or stimulate key

[14] For clarity, we will use the term entrepreneurship policy when referring to this set of policies in a broader sense. And EEP when addressing entrepreneurship policies specifically designed for EEs.

processes (Cavallo et al., 2019), with theorization of entrepreneurship policy formulation still in embryonic stages (Xheneti, 2017) particularly in the context of EE research. The type and extent in which governments should intervene in the development of EEs is a subject of debate, driven by a duality of perspectives. These discussions involve for instance - the type of governance; self-organizing versus government led (Colombelli et al., 2019; Colombo et al., 2019); the drivers of the ecosystem; market versus government (Jung et al., 2017; Stam, 2015); or ontological versus epistemological view of the EE (Wurth et al., 2021). Thus, the formulation of entrepreneurial ecosystems policies (EEP) often fluctuates between this duality of perspectives, that shapes the role of government and entrepreneurship policy in this specific context. Furthermore, despite the lack of solid theoretical foundations (Brown & Mason, 2017; Spigel & Harrison, 2018), and the ongoing debate on the effectiveness of entrepreneurship policies in general, backed by evidence that these policies are not producing the expected results (Arshed et al., 2014, 2016), the rush to develop EEs has vastly surpassed theory development (Stam, 2015).

We are therefore aligned with the thought that entrepreneurship research would benefit greatly from engaging and shaping entrepreneurship policy discussions (Zahra & Wright, 2011). We further consider that the development of EEP should pay particular heed to calls for advancing EE research, through the development of theoretical frameworks (Spigel, 2017; Spigel et al., 2020).

Guided by these concerns, in this study we develop a conceptual framework that comprises key parameters to inform the formulation of EEP. There is a need to engage the development of EEs by formulating a customized mix of policies, that addresses the specific characteristics of the ecosystem. This need is prompted by the following reasons - the impracticality of EEP replication induced by the unique characteristics of each ecosystem (Isenberg, 2010; Mason & Brown, 2014); the need to promote the quality of

entrepreneurship, in order to ensure an allocation of resources towards productive use (Autio, 2016; Stam, 2015); and the holistic character of EEP that results from the complex, self-regulating and interconnected nature of the EE (Isenberg, 2014; Stam, 2015).

The contribution of this paper is twofold. First, we contribute to the theoretical development of the EE literature by categorizing the key parameters for formulating EEP into a comprehensive framework. Entrepreneurship policies often fail due to poor formulation (Arshed et al., 2014). The under-theorization of EE research leaves many questions regarding EEP still unanswered, hindered by myths (Brown et al., 2017) and biases (Nightingale & Coad, 2014). Thus, by comprising different facets of EEP, the framework provides a clearer view of the options for crafting them and diverge from the much-criticized lists of key factors (Alvedalen & Boschma, 2017; Stam, 2015). Second, our research offers practitioners and policymakers a broad view of the options for formulating EEP. Policymakers frequently import practices in an attempt to clone the success of renowned ecosystems disregarding the unique characteristics of each EE (Isenberg, 2010; Spigel, 2017). However, attempts to replicate entrepreneurship policies often fail, even in apparently similar contexts (Colombelli et al., 2019). The conceptual framework sets the emphasis on an ex-ante assessment. Providing a clear understanding of the available options for the formulation of EEP, fundamental for improving policy effectiveness. Thus, engaging on EEP discussion from a perspective valuable for policymaking, answering to calls for a better connection between entrepreneurship research and policymaking (Zahra & Wright, 2011).

The remainder of this paper is organized as follows. We begin with a synthesis of the evolution of EE research. The following section addresses entrepreneurship policy, starting with a synopsis of the evolution of policy support for entrepreneurship, followed

by a delimitation of the concept of entrepreneurship policy and in particular EEP i.e., the set of policies specifically implemented for EE. The fourth section addresses two pivotal characteristics for the EE and its development (a multi-layered phenomenon, and dynamic evolution process) and the duality of perspectives on natural versus artificial development of EE regarding its implications on the role of EEP. In the succeeding section we then systematize the key parameters for the formulation of EEP and present the conceptual framework. This is followed by the discussion of our findings and finally, we provide the conclusions and limitations of our study, also suggesting future research prospects.

3.2 ENTREPRENEURSHIP POLICY

3.2.1 Entrepreneurial ecosystems research and policy

The concept of EE draws insights for management from analogies with the life sciences (Auerswald, 2015), by adopting the ecosystem concept applied in biology for almost a century, to the study of entrepreneurship (Audretsch, Cunningham, et al., 2019; Cavallo et al., 2019). However, the term "entrepreneurial ecosystem" only became widespread in the last decade, particularly since 2016 (Malecki, 2018). Despite increased academic interest on EE, the field "has so far been constructed *ad hoc* by different authors, without any shared definition" (Stam, 2015, p. 1765) leading to fragmentation and under-theorization (Autio et al., 2018; Cao & Shi, 2021).

Nevertheless, there are strong pointers from extant EE literature that suggest a clear and even a natural connection with entrepreneurship policy. Mason and Brown (2014) address these challenges for policy intervention in EEs, while Audretsch and Belitski (2017) provide support for the development of new policies. Policy and the role of government are also major themes for Stam (2015) and Brown and Mason (2017). And

feature as an important issue in the research of several other authors, for example (Ács et al., 2014; Autio et al., 2014; Isenberg, 2011b). Therefore, despite its recent arise EEs have already spawned a veritable boom in research and policy interest.

3.2.2 Evolution of policy support for entrepreneurship

The EE concept is widely adopted by a growing number of diverse institutions, from think-tanks, national agencies, and governments to supranational organizations e.g., OECD (Brown & Mason, 2017), and frequently invoked as a framework for policy debates (Cao & Shi, 2021). This interest rides on an overarching belief in entrepreneurship as a potential solution to many economic problems (unemployment, economic growth, regional development, and innovation) (Nightingale & Coad, 2014). The desire for economic development promised by the potential success of EEs, grant a high level of public support, in diverse institutional settings, dissimilar levels of economic growth and for different types of entrepreneurship (Bruns et al., 2017). Consequently, policymakers have focused their efforts on the development of EEs for over a decade, shifting their focus from individual entrepreneurs and ventures (Roundy, 2019a; Roundy et al., 2018). These policies are part of a wider evolutionary process, strongly conditioned by the historical evolution paths of the economy (Landström et al., 2012), where entrepreneurship has progressively gained prominence in the sphere of public policy (Motoyama & Knowlton, 2016). Entrepreneurship as an influential factor on the actions of policymakers and politicians was noteworthy only since the 80s, influenced by a boost in entrepreneurship research and the belief in Small and Medium Enterprises (SMEs) as a source of job creation (Hechavarria & Ingram, 2014; Landström et al., 2012). By this time, the role of government and policy gradually shifted from traditional market

regulation to a policy aimed at enabling innovation and the development of new small businesses (Gilbert et al., 2004).

In turn, the pressure to provide new answers, generated by the financial crisis of 2008, led to an evolution from SME[15] support policy to an entrepreneurship policy (Lundstrom & Stevenson, 2005). As Motoyama and Knowlton (2016) noted, the policy focus in several OECD countries shifted from clusters to large incumbent firms, and more recently to new high-growth oriented enterprises. The EE approach emerged as a response to the ineffectiveness of entrepreneurship policies, that limited their scope to improving framework conditions for high growth firms (Mason & Brown, 2014). It is noticeable these shifts in policy coincide with the expansion of the EE approach and a growing perception of entrepreneurship as a socially embedded activity (Roundy et al., 2018). Therefore, the development of the EE perspective is aligned and influenced by this policy evolution process.

3.2.3 Understanding entrepreneurship policy

In the previous section, we provided a brief synopsis of the evolution of entrepreneurship policy. This evolution is shaped by entrepreneurships' rising prominence in the economic development agenda of numerous governments (Ács et al., 2014). However, supporting entrepreneurship is a challenging task for governments (Bradley & Klein, 2016), with policymaking in the entrepreneurship field characterized by being complex and messy (Lundstrom & Stevenson, 2005). We understand entrepreneurship policy as the diverse

[15] We differentiate SME policy from entrepreneurship policy, considering the objectives and rationale of SME policy are different (Mason & Brown, 2014). SME policy is built on a market failure rationale and focus on ensuring SMEs have a better chance of competing with large firms, the objective of entrepreneurship policy is to increase entrepreneurial activity and its rationale goes beyond market and system failure (Lundstrom & Stevenson, 2005).

set of policies that are implemented with the purpose of increasing the level of entrepreneurial activity (Audretsch, Belitski, et al., 2021; Gilbert et al., 2004), by inducing a continuous flow of entrepreneurs, and ensuring the existence of conditions that enable the success of their enterprises (Arshed et al., 2014; Lundstrom & Stevenson, 2005).

The concept of entrepreneurship policy is quite ample, and subject to diverse and evolving interpretations (Arshed et al., 2014; Autio, 2016), at times hindered by myths (Brown et al., 2017) and biased assessment (Nightingale & Coad, 2014). Furthermore, in this context, the role of government is not always easy to determine (Lundstrom & Stevenson, 2005). On the other hand, the term 'entrepreneurship policy' may be misleadingly interpreted as a narrow set of policies with very specific purposes, when in fact entrepreneurial policy must reach different aspects of society in a cohesive and prevalent manner (Audretsch et al., 2007).

Any entrepreneurship promotion strategy encompasses different types of policies. For instance, the International Compendium of Entrepreneurship Policies (OECD, 2020) establishes three types of entrepreneurship policies; improving institutional conditions for entrepreneurship, direct support to entrepreneurs and start-ups, and holistic approach to support the development of EEs. Similarly, we hold that entrepreneurship policy encompasses conventional 'buffering', 'bridging' and 'boosting' interventions (Amezcua et al., 2013; Autio, 2016), that aim to protect new ventures, to promote more effective networking and high-growth ventures respectively. The promotion of EEs also falls within the scope of entrepreneurship policy. Furthermore, EEP is a relevant and distinct type of entrepreneurship policy (Autio, 2016; OECD, 2020). However, this does not imply the development of EEs cannot benefit from all the other types of conventional entrepreneurship policies, despite their expected lower level of efficacy, particularly in

the absence of coordination among entrepreneurship policies (Autio, 2016; Autio & Levie, 2017).

Regarding the development of EEs, any policy must take into account the local context. Namely available resources, culture and institutions that have a strong influence on the persistence of entrepreneurship (Audretsch & Belitski, 2021). Especially in peripheral, underdeveloped regions lacking an environment conducive to an entrepreneurial context, public support, enacted through EEP is essential to offset the access to fundamental resources and develop a more favorable context for entrepreneurship (Xu & Dobson, 2019). Furthermore, to be effective this support must address the EE's systemic issues with systemic policy approaches (Brown et al., 2016; Mason & Brown, 2014).

Thus, the kind of entrepreneurship policy required for the promotion of EEs is more complex, involving the co-creation of a context for productive entrepreneurship, leading to a flourishing entrepreneurial ecosystem (Stam, 2018, p. 5). Yet, the current entrepreneurship policy portfolio is still inadequately prepared to handle the challenges EEs represent for policymaking (Autio, 2016). Entrepreneurship policy literature acknowledges that challenges for this type of policy are different and more demanding than those addressed by the still prevalent and well-known framework policies (Audretsch, Belitski, et al., 2021; Autio & Levie, 2017). Neither the system failure (Autio, 2016) nor the market failure rationale alone should be the foundations for EEP (Stam, 2015).

Thus, policymakers face the daunting challenge of deciding between different policy options for developing the EE, risking the consequences of misconceived policy interventions (Acs et al., 2017; Brown et al., 2017; Brown & Mason, 2017). Policymakers act upon macro and micro level institutional environments and induce complex,

cascading, effects (Cao & Shi, 2021; Estrin et al., 2013). Furthermore, generic policy advice has a limited usefulness (Isenberg, 2014; Mason & Brown, 2014) and different policies need to be regarded more as complementary than mutually exclusive. Adding to the previous, policy options must consider that the combination of different types of entrepreneurial activity and regional contexts produce different types of EE outcomes (Audretsch & Belitski, 2021).

EEs have unique characteristics and development paths (Chen et al., 2020; Scheidgen, 2020), need to develop an effective relocation of resources (Audretsch et al., 2018; Autio, 2016) and are complex, multilayer, self-organizing, highly interconnected systems (Isenberg, 2010; Motoyama & Knowlton, 2016). These characteristics of EEs have a significant impact on EEP differentiating them from more conventional entrepreneurship policies (Mason & Brown, 2014). First, EEP have a limited capacity to be replicated, the blend of policies must be adjusted to pre-existing conditions, type of entrepreneurs and other EE actors; as well as the specific, multilayer, dynamically evolving trajectory of the ecosystem (Chen et al., 2020; Mason & Brown, 2014). Second, the policy mix must also ensure the quality of entrepreneurship i.e., allocating resources towards productive entrepreneurship (Ács et al., 2014; Autio, 2016; Stam, 2015), it has been argued that productivity is highly correlated to entrepreneurial activity and innovation (Audretsch, Lehmann, et al., 2019). Lastly, EEP must espouse a holistic approach diverging from previous SME policies (Brown et al., 2017). The core of the EE approach is the integration of a heterogeneity of actors, interacting in multiple and intricate ways in a complex and multi-layered ecosystem (Isenberg, 2010; Theodoraki et al., 2018), EEP must consequently target actors, connectors, resource providers and entrepreneurial orientation (Brown & Mason, 2017). In EE siloed policy interventions have a tendency to be less effective (Autio et al., 2018; Mason & Brown, 2014).

Summarizing, EEP is a particular type, a subset of entrepreneurship policies (Autio, 2016; OECD, 2020). This set of policies is implemented with the purpose of developing a thriving EE through a holistic approach (Arshed et al., 2014; Autio & Levie, 2017; OECD, 2020) by creating a favorable context for the expansion of productive entrepreneurship (Stam, 2018). Improving EEP effectiveness requires a truly systemic perspective of the ecosystem, that comprises its fundamental characteristics and reaches beyond its individual elements. Our research is aligned with this line of reasoning offering insights on the available options for EEP formulation.

3.3 ENTREPRENEURIAL ECOSYSTEMS

3.3.1 Entrepreneurial ecosystem - a multi-layered phenomenon

Ecosystems of any form operate as a set of systems, where each is 'deeply embedded within supra-systems and dependent to some extent on sub-systems and related systems' (Audretsch, Mason, et al., 2021, p. 8). In an EE, different systems collaborate, interacting in a dynamic network of microsystems and macrosystems (Sussan & Acs, 2017) that is to say, the ecosystem is built on several interconnected systems, therefore deemed a multi-layer concept (Theodoraki & Messeghem, 2017). The emphasis in the interconnections between elements of a region's entrepreneurial and economic environment is recognized as a distinctive characteristic of EEs when compared with preceding concepts e.g., clusters or industrial districts (Spigel & Vinodrai, 2020).

Although EEs operate through individual level action (Spigel, 2017), the 'life' of EEs as a complex socioeconomic structure relies in an interconnection of individual agents and their built-in multipolar interactions with institutional stakeholders (Sussan & Acs, 2017). The institutional layer has a relevant role, different institutions facilitate the

development of diverse types of entrepreneurship (Herrmann, 2019). Hence, the institutional structure has a predominant influence on entrepreneurial action, and by its influence on how entrepreneurs develop interactions within the ecosystem. Thus, institutions have an effect on the structure of the EE since it is molded by them (Motoyama & Knowlton, 2016; Scheidgen, 2020). This suggests that an EE as an 'agency and structure are mutually dependent' (Claire et al., 2019, p. 5), and one must consider that individual action is embedded in the complex network of interactions that, in turn, shapes the EE structure (Autio & Levie, 2017). However, this embeddedness of complex interconnections, that is at the core of the EE (Ács et al., 2014), poses several obstacles to the study and implementation of EEP. First, an ecosystem comprises of different levels, and these produce a certain degree of uncertainty regarding the aim of the approach, deemed as one shortcoming of EE theory (Stam, 2015). Different levels of analysis (micro and macro) may lead researchers to focus on distinct aspects of the entrepreneurial process, as a result generating diverse constructs resulting from the different observational perspective of the researcher (Bjørnskov & Foss, 2016; Suddaby et al., 2015). Moreover, singular actors (individual or organizations) lack a comprehensive perception of the EE and thus are compelled to act by trial and error (Autio & Levie, 2017). These partial and frequently optimistic viewpoints produce an often skewed perception of the impact of policy on entrepreneurship and its outcomes (Nightingale & Coad, 2014). Second, entrepreneurship is predominantly associated with the behavior of individuals and firms at a micro-level. Yet policies are concerned with the aggregate result of entrepreneurial activity at regional or national/macro-level (O'Connor, 2013). Hence research focused on the micro-level has not yet conveniently explored the macro-level antecedents and outcomes of entrepreneurship (Bjørnskov & Foss, 2016). Therefore, we need to consider how the outcomes created by different elements impact

the macro level outcomes and conversely how the ecosystem influences the micro-level outcomes and performance (Autio et al., 2018).

We hold that to understand how EEs evolve and formulate entrepreneurship policies with adequate characteristics to be effective in EE development, we must look beyond individual components and encompass these multiplex and multi-layer relations between macro-level institutions and micro-level agents. Making use of a multilevel modelling of EEs offers a way to address the study of the relations between different institutional levels and their interconnection with entrepreneurs (Lucas & Boudreaux, 2020). Several frameworks and models of EEs have been developed (e.g. Isenberg, 2011b; Stam, 2015; Stam & Spigel, 2017; Theodoraki & Messeghem, 2017), yet none of these models, despite being individually of great value, specifically represents the role and evolution of entrepreneurship policy in EEs. To represent these interactions and the different layers of the ecosystem, we drew inspiration from Theodoraki and Messeghem's (2017) three level view of the ecosystem with a 'Coleman[16] bathtub' (Bjørnskov & Foss, 2016). Figure 1 below encapsulates the previous discussion in the form of a multilevel model with three stacked layers. The upper layer, represents the central/national government where general policies are decided, followed by the layer of support organizations[17], these have a more

[16] Coleman, J. D. (1990). Foundations of social theory. Cambridge, MA: Harvard University Press.
[17] We represent the most common situation in EE literature, an ecosystem with a local or regional scope. We also regarded regional or local public organizations as support organizations since their role is quite different from that of the central / national government.

direct connection and influence on the EE. Finally, the core layer, symbolizing the entrepreneurs (individual or companies).

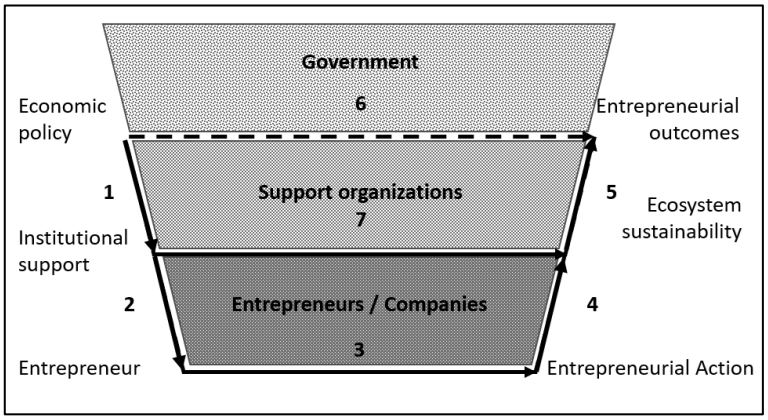

Figure 3-1 - Entrepreneurial Ecosystem's layers

Governments through entrepreneurship policies act on the EE, their aim is to produce economic growth and job creation (entrepreneurial outcomes). The relation between policy and entrepreneurial outcomes (arrow 6) is however indirect and mediated by the levels below (Bjørnskov & Foss, 2016) support organizations and entrepreneurs. EEs achieve economic growth through institutions (Acs et al., 2017), thus entrepreneurship policies (arrow 1) by developing institutional support play a relevant role in the development and sustainability of the ecosystem (arrow 7) (Mason & Brown, 2014). Healthy ecosystems need supportive political institutions (Acs et al., 2017) and these shape the EE. In turn the behavior of entrepreneurs is influenced by the institutional context (arrow 2) in a variety of ways (Boudreaux et al., 2019), and the impact of entrepreneurial action in economic growth (arrow 5) is conditioned by the institutional environment (Bruns et al., 2017).

In a nutshell, the relation between structure and individual action is multiplex, EEP through its impact on the institutional configuration and the availability of different resources, influences the type of entrepreneur and its actions, which in turn have an impact on the structure, the outputs and ultimately the performance and sustainability of

the EEs. Thus, the role of EEP is undeniably crucial, strongly conditioning EE development and sustainability. Such policies exert their influence at different levels and produce diverse system outcomes (Autio & Levie, 2017). Governments may assume different roles in their relationship with entrepreneurship and entrepreneurs (Klein et al., 2010), nevertheless, in order to formulate effective EEPs, policymakers should contemplate the ecosystem as a whole, not disregarding any layer or the cascading effects that result from their interconnected nature.

3.3.2 The evolution of entrepreneurial ecosystems

An EE emerges and endures through a dynamic evolution process (Isenberg, 2014; Malecki, 2018), involving a permanent interaction between systemic and framework conditions (Cavallo et al., 2019). Hence static analyzes of this dynamic concept have been questioned (Alvedalen & Boschma, 2017; Brown & Mason, 2017; Mack & Mayer, 2016). To understand the trajectory and performance of an EE, the analysis of evolution along the temporal dimension is therefore pivotal (Audretsch, Mason, et al., 2021). The evolutionary process is particularly relevant in a concept that focuses on studying the development process of networks, institutions, and a culture in a specific region (Malecki, 2018; Stam & Spigel, 2016). EEs can emerge, grow, and decline; or may recover (Mack & Mayer, 2016). However, this sequence in the evolution process is not deterministic, each ecosystem is unique in its characteristics and naturally in its development trajectory. That is, the evolution towards the declining phase does not necessarily imply the very end of the ecosystem, since the initial development trajectory may eventual be followed by a 'reinvigoration' process (Mack & Mayer, 2016). Thus, the declining phase is

simultaneously the end of a development trajectory and essential for the transition towards a new one.

A successful evolution, and sustainability of the ecosystem depends on its ability to maintain a strong virtuous cycle of entrepreneurship creation, thus generating spillovers and disable or restrain the negative force exerted by its opposite vicious cycle, allowing the entrepreneurial ecosystem to scale-up and grow, achieving a situation similar to what Venkataraman (2004) dubbed state of 'virtuous equilibrium'. The ecosystem's development is therefore fueled by a balance between virtuous and vicious cycles of entrepreneurship, where the importance of disruption in the renewal process of the ecosystem should not overlooked (Auerswald, 2015). However, for the ecosystem to flourish, the spillovers generated by the virtuous cycle should overcome the negative effects of the vicious cycle. Figure 2 depicts this balance and summarizes our arguments for the EE evolution trajectory.

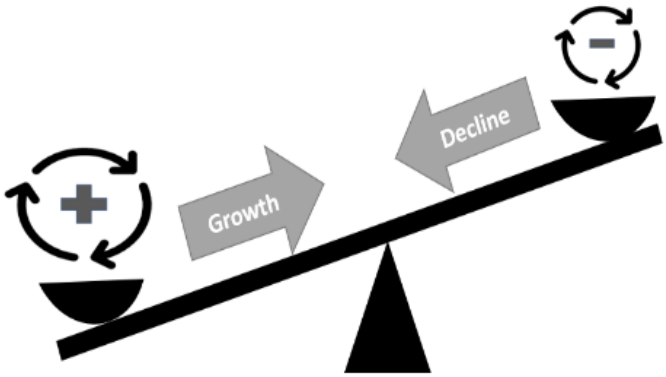

Figure 3-2 - Entrepreneurial ecosystem life cycle

Understanding this continuous and dynamic process of the EE evolution is crucial (Autio et al., 2018), and would further our grasp of its role in the support of venture creation (Spigel & Harrison, 2018).

EEPs are essential in shaping the development trajectory of EEs, therefore they decisively influence the outcomes of the ecosystem's evolution (Brown & Mason, 2017).

On the other hand, this also implies policy approaches, to cope with this dynamic evolution process, must co-evolve along with the EE (Mason & Brown, 2014). Mere listings of factors or elements do not provide an in-depth grasp of the ecosystem's evolution process (Malecki, 2018), and their usefulness to policy formulation is consequently slim. It is necessary to advance new theories to better understand the processes that lead to EE development, however, the underlying principles from other concepts like clusters and innovation systems are inadequate for this purpose (Spigel & Harrison, 2018).

To develop EEs and increase entrepreneurial activity, governments and policymakers must formulate policies that generate virtuous cycles of entrepreneurship (Isenberg, 2011b; Maroufkhani et al., 2018). Venkataraman (2004) contemplated this notion of virtuous, and also vicious cycles, to differentiate regions that successfully develop from those that linger. The importance of creating a virtuous cycle of entrepreneurial creation is consistent with the dynamic nature of the ecosystem and is regularly present in literature (Cao & Shi, 2021; Cavallo et al., 2019; Cukier et al., 2016; Isenberg, 2011b; Maroufkhani et al., 2018; Mulas et al., 2016). Furthermore, it is aligned with the capacity to recirculate resources, regarded as pivotal for providing resilience to the ecosystem (Spigel & Vinodrai, 2020). In order to create or activate these virtuous cycles, several elements such as 'conducive policy, markets, capital, human skills, culture, and support' must be in place (Isenberg, 2011b, p. 6). However, providing the right elements is not enough, EEP must also find ways to stimulate and sustain these cycles to boost EE development. Mason and Brown (2014) describe an entrepreneurial recycling process supported by exiting wealthy entrepreneurs reinvesting in new ventures. Isenberg (2011b) provides a similar mechanism, successful entrepreneurs generate new ventures, developing them becomes their 'hobby'. Spigel and Vinodrai (2020) underline the role of

anchor firms in the recycling process. Regardless of the way a specific ecosystem sustains the process, the virtuous cycle of entrepreneurial creation and its opposite, define the evolution path of the ecosystem. Spillovers generated from established companies and the entrepreneurial recycling process provide the self-sustainability necessary for the evolution of the ecosystem (Alvedalen & Boschma, 2017; Isenberg, 2011b; Malecki, 2018; Mason & Brown, 2014).

Understanding and embracing the systemic nature of EEs, its complexity and its evolution process will provide scholars and policymakers the capacity to develop truly systemic policy instruments, this is critical because entrepreneurship policies, over time, produce significant changes in ecosystems and negatively impact them if misconceived (Brown & Mason, 2017).

3.3.3 The role of the government in entrepreneurial ecosystems

With the increasing prevalence of the EE concept in academic and policy circles (Alvedalen & Boschma, 2017; Autio et al., 2018) two competing views of how to develop an EE coexist, the 'curator'[18] versus 'builder' government (Spigel et al., 2020; Wurth et al., 2021). These distinct views are associated with different perspectives of the EE and its evolution, that in turn, reflect on the role of government (at different levels) and EEP. The first adopts a more 'natural' perspective of the evolution process and a prevalence of bottom-up approaches, while the second supports policy interventions, led by governments, resulting in a more 'artificial' creation process of EEs (Audretsch, Belitski, et al., 2021; Colombo et al., 2019). The 'natural' development perspective puts the

[18] We borrow these labels for the role of government from (Spigel et al., 2020, p. 489)

emphasis on networks and the dynamic self-regulating character of the EE, with multiple actors and drivers, thus suggesting a limited role of top-down policy approaches (Isenberg, 2014; Stam, 2015). On the other hand, top-down approaches play an important role in the second perspective, emphasizing the role of policy, implemented by government or local authorities (Audretsch & Belitski, 2017; Colombo et al., 2019). This diversity is not unforeseen, since entrepreneurship itself is also marked by dichotomies (Claire et al., 2019), and ambiguous theoretical treatment of causal mechanisms (Bjørnskov & Foss, 2016; Bradley & Klein, 2016), with different views influenced by different schools of entrepreneurial thought and their respective interpretation of the consequences of government intervention. With a government-driven approach influenced by a Keynesian perspective, while the market-driven approach advocated by the Austrian School (Nightingale & Coad, 2014), consequently implies that EEs can be understood as market or government driven (Jung et al., 2017).

Thus, the duality of roles for government and policy are deeply rooted [19] in entrepreneurship theory, and result in very different perspectives of the EE concept (Audretsch, Belitski, et al., 2021; Wurth et al., 2021). These in turn have a profound impact on policymaking and its effects on EEs and their outcomes (Audretsch, Mason, et al., 2021). Stam (2015, p. 1761) dubs the EE synonymous of '"privatization" of entrepreneurship policy' when referring to the leading importance of the entrepreneur in the EE, consequently, upholds the role of government as feeder rather than leader. However, this view is not undisputed, with questions lingering. The role of government and EEP remains unclear - should a government play the role of the 'builder' or should

[19] In fact, this dichotomy was already present in Schumpeter's seminal theories on entrepreneurship, envisioning the government dual role in innovation "directly leading or indirectly supporting entrepreneurial activity" (Kattel et al., 2013, p. 3).

instead behave as a ‘curator’ the ecosystem (Spigel et al., 2020)? Furthermore, are these roles mutually exclusive or complementary?

In an EE framework, systemic conditions and their interactions are pivotal (Cavallo et al., 2019). Thus, EEP must blend bottom-up and top-down approaches (Mason & Brown, 2014; Roundy, 2019b). Top-down for developing the adequate framework conditions are mandatory, and bottom-up initiatives involving other levels of government as well as non-government actors, are essential for connecting different actors in the ecosystem (Mason & Brown, 2014). In fact, a more systemic and holistic approach in EEs policymaking is gradually in place (Arshed et al., 2016; Audretsch & Belitski, 2017; Hechavarria & Ingram, 2014; Mason & Brown, 2014).

Similarly, we hold EEP must take on the challenges of developing EEs implementing a mix of policies formulated to address all aspects of their complex and interconnected nature.

3.4 A FRAMEWORK FOR ENTREPRENEURIAL ECOSYSTEMS POLICY

In the previous section we identified two key dimensions of EEs regarding the formulation of EEP. The first focuses on the EE as a multilayer phenomenon, encompassing multiple layers of actors and stakeholders, that interconnect in complex ways in the ecosystem (Theodoraki & Messeghem, 2017). The second addresses the ecosystem’s dynamic evolution process (Isenberg, 2014; Malecki, 2018) and the relevance of that trajectory for the design of EEP. Within these dimensions, we discussed two roles for government in an EE, which we label as the ‘builder’ and the ‘curator’. This duality of roles emerges from different perspectives of the EE concept (Audretsch, Belitski, et al., 2021; Wurth et al., 2021) is frequently addressed in EE literature and

deeply rooted in entrepreneurship theory. Thus, the aforementioned duality is key for understanding different approaches to EEP formulation.

The development of theoretical frameworks can be a significant addition to EE theory (Spigel, 2017; Spigel et al., 2020). Regarding the formulation of EEPs there is a pressing need to improve its effectiveness by advancing theory and providing insights that allow formulating customized mixes of policies according to the unique characteristics of each ecosystem

Figure 3 illustrates our conceptual framework; we now assemble the framework based on the previous review of the concepts and introduce three parameters for policy formulation that emerge from that review, and define the type of formulation and implementation, the target of the EEP, and its scope. To elucidate our arguments, we begin by contrasting these key parameters. The first explores the option between policies implemented top-down and those that emerge bottom-up (Arshed et al., 2016; Brown et al., 2014), this parameter addresses the type of formulation and implementation. Since an EE requires a permanent interaction between systemic and framework conditions (Cavallo et al., 2019) the second parameter underlines the policy formulation option between the support to systemic or framework conditions, i.e., its target. Lastly, we address the parameter that defines the scope of the EEP, that is, the option between a holistic approach or a more specific, siloed approach. The following sections will develop these parameters in more detail and relate them with the previously discussed roles of government and EE dimensions.

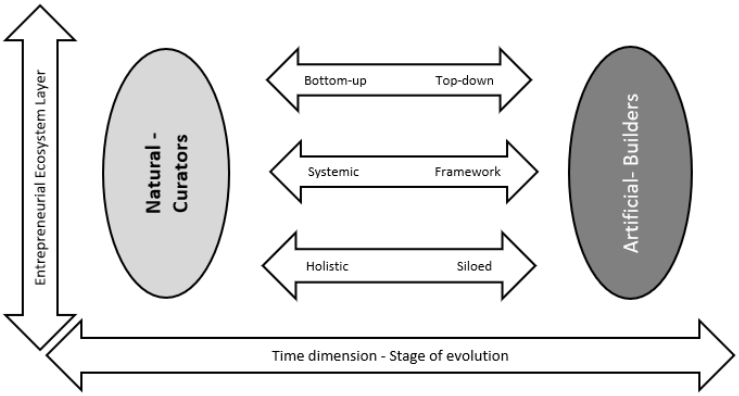

Figure 3-3 EPE Conceptual framework

3.4.1 Bottom-up versus top-down EEP

The choice between bottom-up and top-down approaches to EEP is closely related to the different roles of government and policy in the development of the EEs. A top-down policy approach is one formulated by the government, with little or limited input from local actors. A bottom-up line follows the opposite direction, the policy is implemented by local actors, emerging from the community of entrepreneurs usually without very explicit goals (Arshed et al., 2016). Thus, a 'builder' government formulates and develops top-down EEPs, actively interfering with the ecosystem's evolution, while a 'curator' type of government favors bottom-up formulation and implementation (Spigel et al., 2020; Stam, 2015). The first looks at the EE as an 'artificial' creation, that must be led by government, while the second encourages a self-organizing, 'natural', evolutionary process led by entrepreneurs (Colombo et al., 2019). These are the two furthest points for policy formulation.

In a top-down approach, policy is formulated by policymakers, departing from the government layer (Arshed et al., 2016). Government leads, actively instigating in the base layer of the EE. This type of policy formulation may be formulated to have a direct influence on entrepreneurs, or indirect, through support organizations, e.g., incubators. In

a bottom-up approach the base layer of the ecosystem, the entrepreneurs will have the predominant role, while the government's mission is to feed the EE (Audretsch, Belitski, et al., 2021; Stam, 2015). Thus, policy is formulated to capitalize on the self-organizing capacity of the EE for its implementation. Emerging from 'on the ground' knowledge of operational level agents (Nordling, 2019), including local public-sector agents, non-profit actors as well as entrepreneurs (Mason & Brown, 2014).

This choice between top-down and bottom-up approaches is not static, as the EE itself evolves dynamically (Gifford et al., 2020). Usually, in an early stage of an EE efforts are often concentrated in developing adequate framework conditions through top-down policies (Mason & Brown, 2014), despite insufficient, they are necessary for the ecosystem to reach a critical mass of entrepreneurs necessary for its growth. Naturally, this balance between the need for top-down versus bottom-up approaches will adjust as the EE grows and develops effective self-organization capacity. Furthermore, a blend of both approaches can be advantageous for the development of EEs (Mason & Brown, 2014).

3.4.2 Framework versus systemic conditions

Scholars describe EEs as the interaction of systemic and framework conditions (Cavallo et al., 2019; Stam, 2015). Framework conditions involve factors that directly impact entrepreneurial activity in an EE (Hechavarria & Ingram, 2014), these include physical infrastructure, institutions, and culture (Stam, 2015). Networks of entrepreneurs, leadership, finance, talent, knowledge, and support services, constitute the systemic conditions, these are the core of the EE concept (Malecki, 2018; Stam, 2015; Stam & Spigel, 2016). Thus, entrepreneurship policies directed at framework conditions have the purpose of creating the right environment, preparing the ground for the development of

entrepreneurial activity. These are closer to traditional entrepreneurship policies, while more recent policy approaches aim at improving systemic conditions (Mason & Brown, 2014). The latter being more distinctive of EEP since they address specific characteristics of the EE.

Top-down approaches are more associated with policies aimed at developing framework conditions (Mason & Brown, 2014), thus these usually are formulated by government to have an impact in the base layer of the EE. While the improvement of systemic conditions focused on developing networks within the EE, must engage either the base layer of the ecosystem where most of these networks develop or the support organization layer. These networks of support organizations play a very relevant part in the development of EEs (Motoyama & Knowlton, 2016).

The choice between EEP dedicated at developing framework or systemic policies is likewise conditioned by the evolution stage of the EE and the 'assets' available in the EE (Hakala et al., 2020; Mason & Brown, 2014). As the ecosystem evolution progresses, policies must also adapt and evolve. In an initial stage, policies will probably focus in preparing the ground for increasing entrepreneurial activity, in EEs this corresponds to framework conditions (Mason & Brown, 2014). At a more advanced stage of development, EEP may have a broader focus on systemic conditions, concentrating on developing networks, and synergies between stakeholders (Hechavarria & Ingram, 2014). These 'provide the "glue" to connect the various actors in the ecosystem'(Mason & Brown, 2014, p. 20). However, the development of networks requires the existence of a sufficient number of entrepreneurs and other EE actors to connect. This will limit the feasibility but not the importance of systemic EEP in early stages of the ecosystem. Nevertheless, to ensure the efficient development of an EE it is crucial to ensure a complementarity between framework and systemic conditions (Audretsch & Belitski,

2017; Stam & Spigel, 2016), and this should need for complementarity should be reflected in the formulation of EEP.

3.4.3 A holistic approach to entrepreneurial ecosystem development

EEP has evolved from more conventional approaches, focused on a specific purpose or portion of the EE to holistic approaches that address the different facets, actors, and networks. The emergence of the EE approach reflects this acknowledgment by policymakers and scholars (Audretsch & Belitski, 2017). Policies formulated to address isolated elements of the EE will generally prove ineffective (Mason & Brown, 2014). While holistic approaches that engage in strengthening networks and a favorable context for entrepreneurship are more likely to succeed in developing the EE (OECD, 2020) and revitalizing existing ecosystems (Roundy, 2019b)

It has also been argued that holistic approaches are now a major trend in entrepreneurship policy, particularly in Europe, where the emergence of holistic approaches to entrepreneurship policy are associated to the focus on the role of EEs and their development (Audretsch & Belitski, 2017). However, conventional, siloed policies have their place in ecosystem development, very specific situations e.g., the development of support infrastructures in less developed regions can be addressed resorting to such policies (Autio, 2016).

Holistic approaches should address an ecosystem as a whole. Therefore, they should include all the layers of the EE in a coordinate way, whilst siloed approaches will concentrate in a specific layer. However, holistic approaches to EEPs produce complex, cascading, effects and impacts in multiple layers of the EE (Cao & Shi, 2021; Estrin et al., 2013), making it more challenging for policymakers to decide between the different policy options (Acs et al., 2017). Considering the complex and interconnected nature of

the EE, holistic policy approaches would likely prove more effective in most circumstances (Mason & Brown, 2014). Furthermore, as the EE evolves and becomes more complex, and networks expand, the space for siloed approaches it will be narrower. Nevertheless, the intent to intervein holistically requires the appropriate competences that do not always exist in the public sector (Isenberg, 2011a).

In short, the formulation of EEP should favor, holistic policy approaches, that engage the whole ecosystem, replacing more ineffective, siloed approaches (Autio et al., 2018). However, conventional siloed policy approaches may still be useful and should not be completely disregarded as an acceptable option for very specific purposes and situations.

3.5 POLICY IMPLYCATIONS

The classic rationales for government interventions (externalities, abuse of market power, public goods, and asymmetric information) are no longer sufficient to encompass all the questions raised by developing and sustaining entrepreneurship and innovation in and EE (Stam, 2015). However, market or system failure logic is still what entrepreneurship policy is pursuing in its interventions regarding EEs and what institutions are configured to offer, lacking the capacity for a more efficacious systemic response (Autio & Levie, 2017). From a policy perspective, research is more focused on individual firm behavior or its characteristics (Aldrich & Ruef, 2018; Autio et al., 2018; Cavallo et al., 2019), and has left the role and challenges of government unclear and crossed by ambiguity (Spigel et al., 2020) generating a ‘policy haze’ (Autio & Levie, 2017; Nordling, 2019).

To clarify the discussion, we condensed the options for EEP based on the conceptual framework in two tables. These summarize the options characteristic of a ‘builder’ and a ‘curator’ government.

	Builder	Layers	Stage of evolution
Top-down	EEP formulated by the government, with little input from local actors.	EEP has its origin in the government layer, and it intends to have an impact in the entrepreneur layer. This may be achieved either directly or via support organizations.	EE as an 'artificial' creation, evolution is led by government. Usually more relevant in the early stages of an EE for developing adequate framework conditions and the ecosystem has not reached sufficient critical mass to effective self-organization efforts.
Framework	EEP formulated to provide factors that directly impact entrepreneurial activity these include physical infrastructure, institutions, and culture.	EEP usually has its origin in the government layer, and it intends to have an impact in the entrepreneur layer.	In early stages of EEs policies will probably concentrate in preparing the 'ground' for entrepreneurial activity. The available 'assets' influence the need for this policy focus, e.g., revitalization of declining ecosystems.
Siloed	EEP formulated to focus on a specific purpose or portion of the EE.	EEP formulated to influence a specific layer of EE.	Siloed policy can be implemented at any stage of development to address specific situations.

Table 3-1 Summary of EEP options of a 'builder' government

	Curator	Layers	Stage of evolution
Bottom-up	EEP formulated to be implemented by operational level agents, including local public-sector agents, non-profit actors. Policy emerges from the community of entrepreneurs and 'on the ground' knowledge.	EEP emerges from the base layer of the ecosystem and 'on the ground' knowledge. The entrepreneurs and local public-sector agents and non-profit actors will have the predominant role.	Encourages a self-organizing 'natural' evolutionary process led by entrepreneurs. Generally, more relevant in established EEs.
Systemic	EEP formulated to develop networks of entrepreneurs, leadership, finance, talent, knowledge, and support services.	The EEPs focused on networks of entrepreneurs, leadership, finance, talent, knowledge, and support services, must engage the base layer of the EE where most of these networks develop. However, networks on the support organization layer should also be addressed since they also play a very relevant part in the development of the EE.	The development of networks requires the existence of a sufficient number of entrepreneurs and other EE actors to connect. This will limit the feasibility but not the importance of systemic EEP in EEs early stages of development.
Holistic	EEP formulated to address in a coordinated way multiple elements of the EE.	EEP formulated to influence the ecosystem as a whole.	Important in all stages, but more impactful as the EE develops.

Table 3-2 - Summary of EEP options of a 'curator' government

It has been argued that bottom-up approaches to EEP are more efficient (Audretsch, Belitski, et al., 2021; Mason & Brown, 2014). However, we argue that the formulation of effective EEP must account for the diversity of ecosystems in their characteristics and stage of evolution. One example of the impact of this diversity is provided by literature that suggests a linkage between the cultural attitude towards risk, evidenced by the existence of more bottom-up innovation methods and discretionary learning in Northern Europe, and a prevalence of top-down methods in risk-averse environments in Southern Europe (Arundel et al., 2015). Policymaking in this field is a dynamic evolutionary

learning process i.e., to develop effective EEP, an essential, continuous learning process must occur, and work in both directions (top-down and bottom-up) (Bramwell et al., 2019; Gifford et al., 2020). With the degree of stakeholder involvement, extending from more superficial communication in top-down approaches to a deeper involvement in bottom-up consultation (Autio & Levie, 2017).

Whatever the perspective or their relative weight, development of EEs requires a complex and variate mix of both approaches (Bramwell et al., 2019; Harrington, 2017). Top-down strategies for developing the adequate framework conditions are mandatory, however bottom-up initiatives, involving other levels of government as well as non-government actors, are essential for connecting different actors in the ecosystem (Mason & Brown, 2014). Therefore, policy formulation should take into consideration both types of approaches can be useful and complementary. This blend of top-down and bottom-up is particularly useful for processes of EE revitalization (Roundy, 2019b). In brief, facilitating the development of EEs requires a set of efficiently adjusted policies, intervening at different levels, concurrently applying a tailored mix of bottom-up and top-down approaches (Mazzarol, 2014).

Development of EEs must also comprise several types of policies that deal with framework and systemic conditions (Cavallo et al., 2019), addressing all actors and stakeholders of the ecosystem. To succeed in developing EEs, policy approaches must focus on the ecosystem as a whole, and not isolated components. This will require the use of a mix of several policy types, traditional framework policies blended with more systemic (Brown & Mason, 2017), the complementarity between framework and systemic conditions is pivotal for an efficient EE (Audretsch & Belitski, 2017). A number of examples in the EE literature (e.g., Denmark, The Netherlands or Phoenix) illustrate how significant policy efforts may not utterly achieve a sustainable high growth level of the

EE, despite all the favorable framework conditions created (Mack & Mayer, 2016; Mason & Brown, 2014). Entrepreneurs are the key element of any EE, and they value less traditional business-friendly policies as opposed to the superior importance of more systemic policies like network access and other intangible factors (Auerswald, 2015).

The development of EEs must comprise several types of policies encompassing framework and systemic conditions (Cavallo et al., 2019), blending bottom-up and top-down approaches (Mason & Brown, 2014; Roundy, 2019b) thus addressing all actors and stakeholders of the ecosystem. This calls for policy interventions as holistic as possible (Mazzarol, 2014). The importance of a holistic policy approach is even more imperative in less developed and peripheral regions (Xu & Dobson, 2019) or in the recovery process of established EEs (Roundy, 2019b). And the importance of a more holistic approach is even backed by the advocates of top-down interventions (Colombo et al., 2019). Furthermore, traditional business-friendly policies formulated to improve framework conditions tend to enhance, or at least reinforce the advantages of incumbent firms (Auerswald, 2015), as a result, these siloed policies may deviate from the intention for which they were developed. However, all the different options also make the task of policymaking in an EE context more challenging (Acs et al., 2017).

Holistic policy approaches are in general more effective in EEs (Mason & Brown, 2014) consequently such policymaking approaches are gradually in place (Audretsch & Belitski, 2017; Hechavarria & Ingram, 2014). We hold the development of EEs requires the formulation of a customized mix of EEP. The mix of diverse policies should dynamically adapt to the unique characteristics of the EE and be developed along the parameters of the framework more as complementary than mutually exclusive. Thus, the framework displays a systematized map of the different ways in which EEP can be formulated, according to the characteristics of the ecosystem and the intended effects in

the development of the EE. This can proof useful for policy formulation or diagnostic of an existing EE. The parameters clarify choices of the type, target, and scope of each policy.

To conclude our discussion and to complement the parameters that delimit EEP formulation, we suggest a list of issues that epitomize the characteristics of effective EEP. First, attend to the unique characteristics of the EE namely its pre-existing assets and stage of evolution (Isenberg, 2010; Mason & Brown, 2014). Second, for the success of an EE it is not enough to ensure an increase in entrepreneurial activity, it must also ensure a dynamic allocation of resources towards productive entrepreneurship (Autio, 2016). Such allocation is achieved by recirculating resources (Spigel & Vinodrai, 2020) necessary to generate the amount of spillovers required for the self-sustainability of the ecosystem (Alvedalen & Boschma, 2017; Isenberg, 2011b; Malecki, 2018; Mason & Brown, 2014). Lastly, the successful development of EEs requires the development of a policy mix coordinated to act on different layers, actors, and stakeholders of the ecosystem, a holistic perspective of EEP rather than siloed policy initiatives (Autio & Levie, 2017).

3.6 CONCLUSIONS

The EE concept has gained increasing traction as a development strategy, enthusiastically embraced by the entrepreneurship policy and practitioner communities (Spigel & Harrison, 2018). Our study explores the EE concept from an entrepreneurship policy perspective.

Disparate views of EE development, as a government led, artificial process, or a self-regulated, naturally evolving ecosystem set the stage for different perspectives of the role of government and EEP (Colombo et al., 2019). Governments have an option between playing the role of the ‘builder’ or the ‘curator’ of the ecosystem (Spigel et al., 2020).

However, the formulation of EEP is often hampered by this dichotomy of perspectives. Adding to the circumstance that entrepreneurship policies are known to fail frequently due to poor formulation (Arshed et al., 2014).

Our primary focus was addressing this knowledge gap regarding the lack of solid theoretical foundations, to support formulation of efficacious EEP. The central argument of our paper is that since it is impractical to offer generic, 'one size fits all' EEP solutions, providing guidance regarding key parameters to inform the formulation of EEPs represents an alternative direction to advance research and assist policymaking. Developing an EE requires experimentation and involves uncertainty (Isenberg, 2011a). Each EE has its unique set of characteristics, actors, and evolution trajectory; thus, generic insights have a very limited value. Therefore, instead of a predetermined route we provide a 'map', comprising the different options for the formulation of EEP, departing from extant research to offer a conceptual framework that comprises key parameters to support the formulation of EEPs. We contribute to the theoretical development of EE literature, improving the coherence of the field, by categorizing the key parameters for formulating EEP into a single comprehensive conceptual framework. This is particularly significant in an area of research where theory is still lagging behind practice (Spigel & Harrison, 2018; Stam, 2015), requiring the development of theoretical frameworks that offer more generalizable answers (Spigel et al., 2020). Therefore, the conceptual framework harmonizes apparently dissimilar views of the role of government in EEs, encompassing the different perspectives on EE evolution and a range of alternatives, regarding the formulation of EEP. Our research identified two key dimensions of EE and two roles of government. The dimensions are the ecosystem's dynamic evolution process and its multilayer nature. The roles of government were labelled the 'builder' and the 'curator'. Within this framework three parameters for policy formulation define: the type of

formulation and implementation; the target of the EEP; and its scope. The first explores the option between policies implemented top-down and those that emerge bottom-up, the second parameter underlines the policy formulation option between the support to systemic or framework conditions, the third defines the option between a holistic approach or a more specific, siloed approach.

The results of our research provide practitioners and policymakers a comprehensive perspective of the options for formulating EEP. The lack of research leads policymakers to often develop policies base on an attempt to replicate the success of renowned ecosystems (Isenberg, 2010; Spigel, 2017). However, each EEs is unique and attempts to replicate entrepreneurship policies often fail, even in apparently similar contexts (Colombelli et al., 2019). Thus, providing policymakers and practitioners a clear understanding of the available options for the formulation of EEP is fundamental for improving policy effectiveness. With regard to EEs, policymaking has overridden theory development (Spigel & Harrison, 2018; Stam, 2015) and thus entrepreneurship policies have been implemented in EEs without solid theoretical and empirical foundations (Brown & Mason, 2017; Spigel, 2017; Spigel et al., 2020). Therefore, research in this area is important and impactful. The link provided by engaging on EEP discussion offers essential, actionable advice, a bridge between theoretical development and policymaking. Although EEs are unlikely to arise solely from direct government intervention (Mason & Brown, 2014), EEP contribute and should play a relevant part on the development of the ecosystem. EEP are particularly vital in underdeveloped or peripheral regions were without public support the existing barriers for development will not be overcome (Xu & Dobson, 2019). This underlines the relevance of research in this area, and the call for entrepreneurship scholars to engage in policy discussions (Zahra & Wright, 2011).

By extending entrepreneurship policy formulation to the context of EEs, our research successfully connects entrepreneurship policy and EE literatures. These insights and the conceptual framework thus reach to a wide and the increasing number of scholars who have an interest in both areas of research as well as practitioners and policymakers.

Our work opens up different avenues for future research, hypotheses testing and validation, would constitute an interesting research path. Since existing literature is still predominantly focused on developed countries, further study of developing and emergent economies should also prove an area relevant for advancing research. However, these contexts have merited less attention from entrepreneurship scholars, thus its study will represent an additional challenge.

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CHAPTER 4

EFFECTUATION AND CAUSATION IN THE CONTEXT OF PUBLIC SUPPORT FOR THE DEVELOPMENT OF ENTREPRENEURIAL ECOSYSTEMS

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Abstract

Entrepreneurial ecosystems policies (EEP) are deemed as relevant for the support of the development entrepreneurial ecosystems (EE). EEPs are frequently included in the lists of factors and models of the EEs, however usually as generic descriptions, with limited pertinence for governments and policymakers. A possible pathway for advancing EE research is extending the use of other theories and literatures, that engage similar issues and therefore can provide useful insights. Considering the development of EEs involves a high level of uncertainty, a combination of resources and attributes, that can be combined in multiple possibilities ways, and the evolution of the EE is strongly path dependent, conditioned by variations on endogenous conditions, actors, networks and interconnections; we hold the process of formulation and implementation of EEPs evidences a parallel with the characteristics of the effectual process. Thus, using

effectuation theory can provide a useful tool to describe, and improve the process through which governments enact their support to the development of EEs by formulating and implementing EEPs. Empirical illustrations of effectual characteristics support this line of thought and provided a foundation for incorporating elements from the effectual process and effectual logic into an EEP formulation and implementation model characterized with improved efficacy, agility, and adaptability.

Keywords: Effectuation, entrepreneurial ecosystem, policy formulation, process.

4.1 INTRODUCTION

Policymakers and governments have enthusiastically embraced entrepreneurial ecosystems (EE), considering them as pivotal in shaping entrepreneurship and economic development strategies worldwide (Spigel et al., 2020; Wurth et al., 2021). The concept's burgeoning popularity has also extended to academia (Cho et al., 2022), particularly among scholars engaged in policy, or in the business literature (Cobben et al., 2022; Spigel, 2017). Consequently, EEs are now viewed "as much of a policy construct as an academic concept" (Brown & Mawson, 2019, p. 348).

EE literature has more or less explicitly assumed EEs will develop successfully, as long as the appropriate conditions occur, and the right actors are present (Scheidgen, 2021). Following this reasoning, researchers have primarily focused on understanding what factors (e.g. conditions, elements, attributes) explain the success of prosperous ecosystems (Hakala et al., 2020; Roundy et al., 2018). However, it is now recognized that for advancing the EE research agenda it is essential to understand the dynamic processes that drive the emergence and evolution of EEs and their impact on entrepreneurial activity [e.g. (Audretsch, Mason, et al., 2021; Mack & Mayer, 2016; Roundy et al., 2018; Wurth et al., 2021; Zahra et al., 2022)].

One of the crucial issues for understanding the evolution process of the EEs is determining the influence of EE policy interventions [20] (EEP) (Alvedalen & Boschma,

[20] From here on we will use the expression EEP when addressing EE policy interventions. In our study we use the term policy intervention in a broad sense as an umbrella concept, that encompasses all the interventions of different types of public sector actors upon institutions and other actors of the ecosystem, in coordination, or not, pursuing their own interests or assigned missions, thus having an impact on the ecosystem. Following Mason & Brown (2014, p. 3) we borrow from the definitions of industrial policy nested in Warwik's definition of industrial policy as "any type of

2017; Cho et al., 2022). However, EEPs' influence in the evolution process of is yet to be fully understood, since theoretical development has not accompanied the hasty implementation of these interventions (Brown & Mawson, 2019; Wurth et al., 2021). Extant studies despite deeming EEP as relevant for the support of the ecosystem's development, often included in their lists (of success factors) do not depart much far from generic descriptions, with limited pertinence for governments and policymakers (Feldman & Lowe, 2018; Stam & van de Ven, 2021).

A possible pathway for advancing EE research is extending the use of other theories and literatures, that engage similar issues and therefore can provide useful insights (Cobben et al., 2022). This strategy finds solid precedents in entrepreneurship literature (Fisher, 2012; Ghezzi, 2019; Welter et al., 2016). To engage in such theoretically focused development path, we must resort to theories that are compatible with the ecosystems' specific characteristics and have addressed analogous circumstances. The development of EEs involves a level of uncertainty, thus, understanding how EEPs can deal with high uncertainty is crucial for their implementation and the evaluation of their outcomes (Carayannis et al., 2022; Feldman & Lowe, 2018). EEs emerge from a combination of resources and attributes, however, there are multiple possibilities of configuring these elements to attain the ecosystem's development (Spigel, 2017). Furthermore, EEs evolution trajectory is a result of a complex, adaptive and dynamic process (Audretsch, Mason, et al., 2021; Theodoraki et al., 2022), deemed as strongly path dependent, and that is conditioned by variations on endogenous conditions, actors, networks and interconnections (Brown & Mason, 2017).

intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity towards sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention"(Warwick, 2013, p. 16) and similar definition in (Pack, 2006, p. 268)

Additionally, the use of static theoretical frameworks has merited criticism, for being inadequate to address EEs complex and dynamic nature (Alvedalen & Boschma, 2017), this suggests the need for a theoretical framework that includes a dynamic, adaptable process. These characteristics, the ability to deal with uncertainty, choosing from alternative uses or combinations of endogenous resources and the need to dynamically adapt, inspired us to consider the parallel with the characteristics of the effectual process (Sarasvathy, 2001, 2008).

We propose the effectuation theory (Sarasvathy, 2001, 2008; Sarasvathy et al., 2014) provides a useful tool to describe, and improve the process through which governments enact their support to the development of EEs by formulating and implementing EEPs.

This is an important step for EE research but also to policymaking and practice. Research must increase its pace to keep up to EEPs' implementation rhythm, but it is also essential to address these interventions it with a solid theoretical focus that still lacks in extant literature (Autio et al., 2018; Wurth et al., 2021), still characterized by generic descriptions, lists and prescriptions that have a limited applicability (Feldman & Lowe, 2018; Stam & van de Ven, 2021). These generic descriptions are often translated into ineffective policy isomorphism, in other terms, misguided efforts to enact policies that have been successful in well-known ecosystems (Brown & Mawson, 2019; Isenberg, 2010).

Our work offers three relevant contributions. First, we extend the application of effectuation, to the study of EEPs. This is an innovative approach that addresses relevant issues in the path for EEs theoretical development. To our knowledge, the use of this theoretical perspective has never been explored before in this context, where use of extant theories as a way to advance the domains' theoretical development is regarded as relevant but still sparse (Autio & Levie, 2017). Our research simultaneously answers to repeated

calls for the advance of the EE research agenda by studding EEPs' role in the evolution of ecosystems (Cobben et al., 2022; Spigel, 2017; Wurth et al., 2021) and a better understanding of the influence of uncertainty in EEPs (Carayannis et al., 2022; Feldman & Lowe, 2018). Positioning our study as part of a growing stream of research concerned with understanding the role of governments and EEPs in entrepreneurial activity and the ecosystems' evolution (Spigel & Vinodrai, 2020). Particularly in contributing to improving what we know on how these processes work (Brown & Mawson, 2019; Stam & van de Ven, 2021).Furthermore, our approach offers an analysis that clearly differentiates the study of the process of government support through EEPs from the analysis of the EE and its performance, this has been an important handicap for the advancement of EE theory (Autio & Levie, 2017; Spigel, 2017).

Second, our research incorporates two key concepts in current economic development models, ecosystems and complexity (Feldman & Lowe, 2018). Notwithstanding the primary focus on theoretical development, this research offers policymakers and practitioners insights on EEPs that, despite the boost in EE literature are still scarce. For policymakers there is a compelling need to understand how governments can provide effective support for EE development (Spigel & Vinodrai, 2020; Wurth et al., 2021). In the absence of more developed insights provided by research, policymakers often resort to replication of successful EEPs, nonetheless, this type of isomorphic strategy is inadequate and in fact often fails (Colombelli et al., 2019). More even, by shedding light over the role of EEPs we contribute to the recognition of its relevance by other EE actors (Scheidgen, 2021) and therefore the effectiveness of their impact.

Third, it has been argued effectuation and causation co-occur and are complementary (Grégoire & Cherchem, 2020; Sarasvathy, 2001) and their combination may represent a

source of value creation based on endogenous contexts (Welter et al., 2016). We hold this complementarity is relevant for value creation and has a parallel to what has been described regarding the process of ecosystems' evolution. Since EE evolution is both sensitive to initial endogenous conditions that shape its future development, and positively affected by injections of exogenous resources (Roundy et al., 2018). Entrepreneurial-led (based on endogenous resources) and government-led (supported in providing exogenous resources) evolution paths are viable and, at least in part, not mutually exclusive, being a key issue for understanding the evolution of EEs (Cho et al., 2022).Hence, EE development builds on a mix of its present resources and context, with policymaking efforts that are crucial for repositioning and changing the regions development trajectory by conveying regional development efforts towards higher value activities (Feldman & Lowe, 2018). This capacity to create value is fundamental for the development and sustainability of EEs hence the increased relevance of studies that address this issue.

The remainder of this paper is organized as follows. We begin by briefly portraying the theoretical background and evolution of the EE concept and literature. In the succeeding sections we summarize and compare the central characteristics of each theoretical approach in light of the purpose of our research. In the following section we explore how an effectual approach connects with EEPs and present four propositions. Next, we present an empirical illustration of effectual characteristics in EEP processes. The following section synthetises both approaches to develop a model for effectually developing and implementing EEPs. Finally, we present and discuss our findings, provide the conclusions and limitations of our study, also proposing future research prospects.

4.2 THEORETICAL BACKGROUND

4.2.1 Entrepreneurial Ecosystems

The study of EEs extends the ecosystem concept, used in biology for almost a century, was introduced in the entrepreneurship field about three decades ago (Cavallo et al., 2019). Following the publication of James Moore's (1993) influential text, the "ecosystem" metaphor was disseminated in social sciences and in particular in management (Brown & Mason, 2017; Malecki, 2018; Neumeyer & Santos, 2018; Roundy et al., 2017), and the connection to entrepreneurship was later on introduced by the seminal works of Cohen (2006), Isenberg (2010) and Feld (2012). However, the term "entrepreneurial ecosystem" became common only since the last decade (Alvedalen & Boschma, 2017; Stam, 2015), and more widespread since 2016 (Malecki, 2018). Other concepts e.g. "infrastructure for entrepreneurship" (Van De Ven, 1993) or "entrepreneurial system" (Spilling, 1996) preceded the emergence of EE, and may be considered closely related (Alvedalen & Boschma, 2017; Malecki, 2018; Maroufkhani et al., 2018).

EE literature shares with other concepts the belief in the influence of existing regional attributes in the competitiveness of new ventures (Fotopoulos, 2022; Spigel, 2017), while offering a new perspective on the clustering of economic activity that emphasizes the interactions between framework conditions and local/regional geographical environments (Mason & Brown, 2014). The EE concept regards entrepreneurship as the output of the ecosystem (Alvedalen & Boschma, 2017) and provides a systemic perspective, able to handle the complexity of entrepreneurship and search for answers concerning the prevalence and performance of entrepreneurship (Stam, 2015).

The EE perspective has been widely adopted by a diverse and increasing number of institutions, from think tanks, national agencies and governments to supranational organizations (Brown & Mason, 2017), and is often referred to as a framework for policy debates (Cao & Shi, 2021). Policy-makers have focused on supporting the development of EEs over the past decade, simultaneously scholars progressively shifted their attention from entrepreneurs and ventures to EEs (Roundy, 2019a; Roundy et al., 2018). However, the field is frequently acknowledged as fragmented and undertheorized (Hakala et al., 2020; Thomas et al., 2018; Wurth et al., 2021), lacking a robust analytical framework.

The fragmentation and under-theorization are reflected in an ambivalence of how the EE is conceptualized and interpreted. Wurth, Stam and Spigel (2021) deemed it as ontological and epistemological conceptualizations. The first perspectives EEs as an organizational form, that is created and arises under the right conditions, the latter aims to 'know' the EEs within existing economic systems and the extent of the value they create (Phillips & Ritala, 2019; Wurth et al., 2021). These different conceptualizations have some correspondence with the also ambivalent natural and artificial interpretations of EE development and evolution, uncovered by Colombo et al.(2019). If an EE is regarded as an artificial system, there is an important role for top-down policy intervention, on the other hand if the EE is interpreted as a natural, autarkically evolving system, there is little room for any sort of intervention (Colombo et al., 2019). It has also been argued, the evolution of EE is shaped by the form of governance, with the type of governance ranging from a hierarchical to a relational type, the first led by a central actor and based on explicit rules and the latter based on shared norms and informal routines (Colombelli et al., 2019). This, once more, evidences a duality between a self-organized (relational governance) and a managed (hierarchical governance) perspective of the

evolution of EEs. All these different perspectives bring about the central role of the evolution process in EE research.

The evolution process of the EE is not static, linear or even uniform along its elements and layers, it displays a complex evolution dynamic that is a vital characteristic of an ecosystem (Audretsch, Mason, et al., 2021). Developing a better understanding of the evolution process is a crucial step in the EE research agenda (Cho et al., 2022; Phillips & Ritala, 2019). Currently scholars' perspective on EE evolution is evolving from a more linear life-cycle (Mack & Mayer, 2016), towards a complex adaptive system (Daniel et al., 2022; Roundy et al., 2018), that is more adjusted with the inherent characteristics of EEs (Cho et al., 2022; Theodoraki et al., 2022). Namely "a strong path dependence" in EE's evolution (Stam & van de Ven, 2021, p. 827). That is contingent of the ecosystems' one-off initial conditions, and subsequent non-linear, complex and dynamic feedback processes, consequently, EE's evolution paths are equally unique and with uncertain outcomes (Roundy et al., 2018). Accordingly, it is acknowledged that the implementation of EEPs faces a high level of uncertainty (Carayannis et al., 2022) and may involve improvisation and experimentation (Armanios et al., 2020; Feldman & Lowe, 2018).

4.2.2 Effectuation

Building on the seminal work of Sarasvathy (2001) the concept of effectuation is presently recognized by entrepreneurship scholars as an important form of entrepreneurial behavior (Jiang & Tornikoski, 2019). Effectuation processes depart from a set of available means at the disposal of the entrepreneur ,who chooses from the possible effects that may be achieved with those means (Sarasvathy, 2001). The effectual process is characterized

by the dimensions of experimentation, affordable loss, and flexibility (Chandler et al., 2011).

Effectuation portraits a decision-making logic suitable for uncertain contexts (An et al., 2018). When statistical inference and the expected value of alternatives is impossible to calculate (Chandler et al., 2011), rather than defining goals and mobilizing the necessary resources, the entrepreneur accepts uncertainty as an opportunity, engaging in a nonlinear process where the focus is selecting between possible effects of the resources he controls (Pacheco et al., 2010). Entrepreneurs allow goals to arise and change as they utilize the means under their control, not defining in advance their target costumers (Fisher, 2012). According to the effectuation logic, entrepreneurs in dynamic environments with a high level of uncertainty, prefer to control an unpredictable future than attempt to predict an uncertain one (Jiang & Rüling, 2019).

4.2.3 Causation

To portray the traditional perspective on entrepreneurship Sarasvathy (2001; 2005) used the causation construct. According to the causational perspective the actions of the entrepreneur are guided by careful planning and predictions, towards a predetermined goal (Ghezzi, 2019), selecting among means to create the predetermined effect. Causation is in fact the theoretical base of an important part of entrepreneurship literature (Chandler et al., 2011). The aim of entrepreneurs in a causation logic is knowing the predictable aspects as a way of being able to handle the uncertainty of the future (Servantie & Rispal, 2018). Opportunity identification and evaluation, planning, and resource acquisition are the factors that comprise the explanation of causation (Fisher, 2012).

In a causation logic the entrepreneur starts by defining objectives, and from them seeks to identify opportunities to explore (Chandler et al., 2011). The entrepreneur then selects between means to produce the anticipated effects, as a way to achieve the previously determined goals (Janssen et al., 2018). Thus, causation suitably describes the actions of entrepreneurs that join an established market or industry and identify existing opportunities rather than create new ones (Fisher, 2012; Sarasvathy, 2001).

4.3 EFFECTUATION ATTRIBUTES AND EEPS

Effectuation describes the behavior of entrepreneurs in creating opportunities, markets and ventures departing from the resources and skills under their control, as well as those at the disposal of other stakeholders they can access (Sarasvathy et al., 2014). This theoretical lens and its counterpart, causation, have been used as tools for explaining the entrepreneurial process, and are presently well-established in entrepreneurship literature (Sirén et al., 2019). They are also deemed as emerging theories in EE research (Hubner et al., 2021).

Effectuation provides a way to cope with high levels of uncertainty and when compared with causation exhibits a duality between ways of engaging the entrepreneurial process, a contrast between an emphasis on predicting versus controlling; but also between the effective use of endogenous (means at hand) versus resorting to exogenous resources (Fisher, 2012; Sarasvathy, 2008).

The causal logic selects a path towards a predetermined outcome (planning), while under the effectual logic a path towards an unpredictable future is gradually established (controlling) (Welter & Kim, 2018). We hold the latter exhibits a greater correspondence

to the process of EEP formulation and implementation along the ecosystems' evolution trajectory than the first.

To demonstrate our proposal, we begin by establishing a four-pronged parallel between the characteristics of effectuation (Sarasvathy, 2001, 2008) and the process through which governments enact EEPs. First, the limited possibility of policy replication (Brown & Mawson, 2019) and the complex evolution trajectory of EEs, characterized by path dependence, nonlinear dynamic and self-organization (Daniel et al., 2022; Roundy et al., 2018), requires policy improvisation and experimentation being often used in EEPs (Armanios et al., 2020; Feldman & Lowe, 2018). The effectual process characterized by successively adding new resources and adjusting the goals (Sarasvathy et al., 2014), provides a way to navigate through this need to experiment and continuously adapt EEPs to the ecosystems evolution.

Second, the effectual logic, considering its capacity to deal with uncertainty and bounded cognition (Sarasvathy & Dew, 2005) exhibits a parallel with the uncertainty involved in EEP interventions, in a context characterized by complex interconnections, self-organization and nonlinear dynamic of its processes (Roundy et al., 2018). Therefore, effectuation, can provide a pathway for implementing EEPs, since governments are led into a situation charaterized by the complexity and incomplete knowledge of interconnections between elements, uncertain outcomes, and the need to continually adapt the policy mix, that are distinctive of the EEs.

Third, the complex interconnections translated into the ecosystem's networks are a key feature of EEs. Accordingly, one of the main purposes of EEPs is the strengthening of these networks (Stam, 2015; Stam & Spigel, 2016), that are mostly self-regulated and composed by the EE actors an stakeholders (Isenberg, 2014; Stam, 2015). Effectuation theory also upholds the central role of the effectual network, particularly in the expansion

of engaged resources and self-selection of stakeholders (Sarasvathy et al., 2014; Sarasvathy & Dew, 2005). Therefore, there is a correspondence regarding the role of stakeholder networks, where insights from the effectual process can be useful for EEPs.

Finally, the role of endogenous resources, processes and actors is key for EE evolution (Clarysse et al., 2014; Lowe & Feldman, 2017; Thompson et al., 2018) , and even more relevant in a limited resource context. Effectuation process begins by considering the alternative uses for the available means (Sarasvathy et al., 2014), this approach is essential for EEPs in resource scarce, contexts where the access to exogenous resources is limited.

Therefore, policy interventions aiming to support the development of EEs, in other words, how EEPs are enacted, exhibits important similarities with the effectual logic and the characteristics of effectual processes. This suggests that an effectual approach to EEPs can provide solutions for some problems usually associated with this type of intervention, namely departing from a scarce resource base, coping with high levels of uncertainty induced by the complex nature and dynamic evolution process of EEs.

We also argue effectually enacting EEPs complies, to different extents, with the five principles of effectuation as defined by Sarasvathy et al. (2014); bird in hand, affordable loss, crazy quilt, lemonade, and pilot-in-the-plane, as we will propose in the subsequent sections.

4.3.1 Entrepreneurial ecosystems as complex systems and policy experimentation

An EE may be regarded as a complex system, that emerges within an economy, where a set of local means and actors produce entrepreneurial outputs and outcomes (Wurth et al., 2021). Roundy et al. (2018) conceptualized the EE as a complex adaptative system and

uphold complexity science as appropriate to explain the emergence of the ecosystem. This line of thought has been also adopted by other authors (e.g., Daniel et al., 2022; Nylund et al., 2022; Phillips & Ritala, 2019), to the point of being presently considered as one of the field's critical debates for the near future (Cho et al., 2022; Theodoraki et al., 2022).

To develop effective EEPs, the complexity of the ecosystem, generated by interdependence and interconnections between different elements and types of actors, must be taken into consideration (Roundy et al., 2018). However, the complex dynamic of EEs evolution and the heterogeneity of its actors and interconnections represent a challenge for policy-makers (Gomes et al., 2021). Often imposing the need for policy experimentation to develop effective EEPs (Feldman & Lowe, 2018; Stam, 2018). The need to experiment is imposed on one hand, by the characteristics of a complex adaptative system such as the EE, namely its nonlinear dynamics, self-organization and open borders (Carayannis et al., 2022; Roundy et al., 2018). And on the other hand, by the unique characteristics, that include the context from which the ecosystem evolved and the path-dependence that conditions its evolution (Daniel et al., 2022). Thus, generic solutions and policy replication are of little use, being generally ineffective (Brown & Mawson, 2019; Isenberg, 2010).

In such a context improving the performance of the (eco)system is not at the reach of purely logical processes (Sarasvathy & Dew, 2005). With the predictive logic of a causation type of approach (Sarasvathy, 2001) being inadequate for such a purpose. Furthermore, the conventional predictive logic, often translates into the ecosystems and EEPs performance being inadequately measured by simple counts of its elements and actors, these measures are unable to encompass the complexity of the EEs interconnections and elements (Roundy et al., 2018). In turn, this incapacity limits the

value of insights provided by EE literature, being one of its currently critical issues (Carayannis et al., 2022).

Contrarywise, the iterative evolution of some EEP interventions (Bramwell et al., 2019) resonates with the iterative characteristics of the effectual process. More specifically with experimentation, flexibility and iterative learning that are part of the effectual process a nd strange to the predictive nature of causation (Fisher, 2012; Sarasvathy & Dew, 2005).

There is also a parallel between the relevance of endogenous resources at the initial stages of development, the need to mobilize stakeholders and the unique characteristics of the EE (Daniel et al., 2022), and the effectual cycle and principles. More specifically the bird-in-hand principle, exhibits a correspondence with the importance of the initial context of the ecosystem, as complex system, in its future development. This parallel extends to the effectual cycle, gathering the commitment of stakeholders and adjusting the trajectory is also fundamental for EEPs and for the development of the ecosystem. Furthermore, in its efforts to guide the evolution of the EE and considering its complex and self-organizing characteristics(Roundy et al., 2018) governments often act as the pilot-in-the-plane, since they are unable to the predict the evolution of a complex self-organizing system, but expect to influence its trajectory with efficient EEPs.

> ***Proposition 1*** *EE are complex adaptative systems where the development of effective EEPs requires experimentation, evidencing characteristics adequate for an effectual approach.*

4.3.2 Entrepreneurial ecosystems policies and uncertainty

EEPs involve decision-making in a context that includes a high level of uncertainty (Carayannis et al., 2022; Isenberg, 2011b). Evolution in a high uncertainty context is possible if multiple agents, with complex motivations, recognize they are part of a community, and engage in a cooperative effort to select and develop possibilities (Sarasvathy & Dew, 2005). This co-evolution process between entrepreneurs and the ecosystem that results in continuous mutual adaptation (Roundy et al., 2018; Scheidgen, 2021), reinforces the similarity with an effectual process. However, uncovering these co-evolution processes is deemed as a crucial but also intricate issue for EE research (Carayannis et al., 2022). Therefore, effectuation can offer insights for EEPs on the co-evolution processes that are key for EE development.

EEPs have been described as a "delicate balancing act", a challenging task that entails a complex equilibrium between different elements and a need to engage in cooperation with multiple stakeholders (Brown & Mason, 2017, p. 20). Through EEPs governments face the difficult task of allocating limited resources, choosing between supporting a wide range of elements and actors (e.g., different industries, technologies, types of actors) this naturally involves a high level of uncertainty (Stam, 2018). The classic policy rationales i.e., market and system failure are not suitable for developing EEs, since under these rationales, policies are usually implemented top-down and assume there is a predictable outcome (Autio, 2016). This conflicts with the characteristics of EEs, namely its self-organizing nature, dynamic evolution process (Daniel et al., 2022) and the unpredictability of the EEP outcomes (Carayannis et al., 2022; Feldman & Lowe, 2018). Moreover, it has been argued, planning efforts have a limited usefulness in projects with uncertain outputs and developing over long periods of time, such efforts may hinder the

capacity to adjust and develop opportunities, that is critical in uncertain and high unpredictability scenarios (Sirén et al., 2019).

In such contexts effectual approaches provide advantages especially in early stages of development: they embrace uncertainty engage in transforming contingencies into opportunities, (Lemonade); require less resources and cost evaluation (Affordable-loss); and do not require prediction and elaborate planning (pilot-in-plane) (Fisher, 2012; Sarasvathy et al., 2014). More even the effectual cycle allows a continuous adjustment either by engaging stakeholders and the resources they bring into the ecosystem, as well as by incorporating constraints that continuously adjust the trajectory (Sarasvathy & Dew, 2005). Consequently, the understanding the effectual cycles, may provide insights for decision-makers regarding the implementation and improvement of EEPs.

Proposition 2 *Developing EEPs imply decision-making in a context of high uncertainty, which is suitable for an effectual approach.*

4.3.3 Entrepreneurial ecosystems policies and stakeholder networks

Networks of entrepreneurs, finance, knowledge, and support services, are the core of the EE concept, deemed as the systemic conditions (Malecki, 2018; Stam, 2015). Furthermore, networks are crucial element in the development of EEs, emerging from public private partnerships as well as interaction and cooperation among several actors of the EE (Candeias & Sarkar, 2022; Wurth et al., 2021). These are vital to ensure a sustainable level of entrepreneurial activity within the EE (Roundy et al., 2018). Dynamic networks safeguard new ventures' access to essential resources and ensure knowledge sharing occurs, thus networks are the "communal lifeblood" of the EE (Brown & Mason, 2017, p. 20). An efficient allocation of resources key for EEs development and thus, the

performance of the ecosystem is considerably dependent on the performance of its networks (Hubner et al., 2021). The reinforcement of these networks is the main purpose EEPs directed at improving systemic conditions (Stam, 2015; Stam & Spigel, 2016). This type of policy approach emphasizes the role of networks upholding the dynamic self-regulating character of the EE and a limited role for top-down policy approaches(Isenberg, 2014; Stam, 2015).

In effectual processes the impact of entrepreneurial action over time establishes a network of stakeholders deemed the effectual network (Sarasvathy & Dew, 2005). This network is fundamental for one of the cycles of the effectual process, the resource expanding cycle (Sarasvathy et al., 2014).

Hence there is also a parallel between the role and importance of partnerships and cooperation of effectual logic (Ghezzi, 2019) and its role in the development of EEs, namely to ensure an effective allocation of resources (Autio & Levie, 2017). EEPs role in improving systemic conditions is to build or reinforce partnerships and cooperation (a crazy quilt) that facilitates and expands the access to resources and knowledge within the ecosystem. By doing so initiates a process that may be described as a cycle of resource expansion that is fundamental for the vitality of the ecosystem (Auerswald, 2015). And finds correspondance in the effectual cycles of expanding means and convergence of goals (Sarasvathy et al., 2014), that result from these partnerships.

> ***Proposition 3*** *The development of stakeholder networks exhibit similar functions in the development of an effectual process and the development of EEs. Evidencing characteristics adequate for an effectual approach to EEP.*

Entrepreneurial ecosystems policies and limited resources

Innovation and the development of EEs is possible even with limited resources in both developed and emerging economies c.f. (De Massis et al., 2018; Qi et al., 2019; Wu et al., 2010). Governments at a regional or national level, engaging in the also complex task of supporting the development of an EE, depart from a set of means that are limited, and include demographics, technology and institutions (Sarasvathy, 2001). Departing from local means and existing contingencies may be an intelligent way to intervene and find acceptable/viable solutions (Sarasvathy & Dew, 2005).

For EEs endogenous resources are determinant for the evolution trajectory (Feldman & Lowe, 2018). However, even small differences in the initial conditions of the EE have a considerable influence on its evolution (Roundy et al., 2018). Therefore, decisions regarding the use of endogenous resources have a determinant influence in the future evolution of the EE that is characterized by a high level of path dependence (Stam & van de Ven, 2021).

Effectual action allows the exploration of a set of given means and to handle many contingencies and opportunities they draw in (Fisher, 2012). The effectual principles bird-at hand, affordable loss and lemonade address the importance of endogenous resources (Sarasvathy et al., 2014). Therefore, can bring valuable insights for EEPs, since endogenous resources are crucial for EE development (Thompson et al., 2018), and .

It has been argued effectual approaches find a particular emphasis in resource limited environments (Hubner et al., 2021). Effectual processes depart from a limited set of available resources (Sarasvathy, 2001, 2008) this is very similar to the EE context where resource limited environments are also frequent and particularly relevant for the study of emergent economies.

Considering EE the complex systems characteristics evidenced in the ecosystems' evolution, underlines the importance of initial conditions (specifically its endogenous

resources) and the ensuing influence in its path dependent trajectory (Feldman & Lowe, 2018; Roundy et al., 2018). This enhances the importance of developing effective EEPs that are able to guide the evolution of the ecosystem, underlining the importance the effectual principles (bird-at hand, affordable loss and lemonade of governments' role as the pilot-in-the-plane.

Proposition 4 *An effectual approach is adequate for EEPs in a context of resource scarce context.*

4.4 EMPIRICAL ILLUSTRATIONS OF EFFECTUATION IN EEP

In this section, we illustrate our theory with examples of EEPs that implicitly incorporated features of the effectual approach, following a review of extant literature[21]. Our search focused on finding examples that contained descriptions of the formulation and implementation EEP process with enough detail to allow an evaluation of its features. The most detailed and complete example we found was the case of Ontario since it describes and EEP process along an extensive period, as the authors emphasize it "two decades of political commitment to policy experimentation is comparatively rare" (Bramwell et al., 2019, p. 285). Nevertheless, we also provide examples of three more ecosystems where effectual characteristics are present in the development process of EEPs. The examples are listed in Table 1. To provide our empirical illustration we adopt a twofold strategy. First, we relate the evidence to our propositions. Additionally to reinforce our illustration we relate Ontario´s example to the characteristics of an effectual approach adapted from Fisher's (2012) study.

[21] A search in WoS database returned 392 results (TS=(entrepreneur* NEAR/0 ecosystem$ AND entrepreneur* AND (policy OR policies)). We refined our search to case studies that resulted in 73 papers.

Characteristics	Location	EE actor	Study
Largest region of Canada The "industrial heartland"	Ontario - Canada	Federal and provincial governments Ontario Network of Entrepreneurs (ONE)	(Bramwell et al., 2019)
A large city recovering from a period of social and economic decay	St Louis – USA	Arch Grants – nonprofit organization	(Motoyama & Knowlton, 2016, 2017)
A small island developing a Gaming industry ecosystem	Malta	Government and governmental agencies	(Yamamura & Lassalle, 2020)
Research Triangle Park (RTP)	North Carolina - USA	Government and governmental agencies	(Feldman & Lowe, 2018; Lowe & Feldman, 2017)

Table 4-1 - - Summary of studies

4.4.1 Evidence of policy experimentation

There are several features in the EEP formulation and implementation process of Ontario that display elements of an effectual process. The most evident is that in this case the formulation and implementation process of EEPs is clearly characterized by experimentation, conceived as a process of reflexive policy learning (Bramwell et al., 2019). As the authors refer, government "began experimenting with a place-based policy framework that has been progressively refined and expanded over time" (Bramwell et al., 2019, p. 278). EEP's experimental nature is clearly recognized by the government and the different EE stakeholders, it is also reflected in the different phases that successively adjusted the EEP's aims and policies. Furthermore, the process is characterized by a high degree of openness and flexibility, with an explicit acknowledgement of the "messy" nature of EEP (Bramwell et al., 2019, p. 279).

Feldman and Lowe (2018, p.339) describe how EEP in the Research Triangle Park (RTP) was continuously adapted, stating "rather than the result of a plan with a known path forward, there were many unanticipated events". The authors highlight the importance of a progressive approach to the region's economic development has been in

place for more than 60 years. This development was catalyzed by EEPs, combined efforts of public and private stakeholders and was flexibly adapted to different stages (Feldman & Lowe, 2018). One example of this occurred during the 80's period, where the development plan was based on technological driven development and small business centers at the community colleges that "entailed uncertainty and thus required policy experimentation" (Feldman & Lowe, 2018, p. 342). St. Louis also provides an example of an iterative process of EEP. Despite not being deliberate (there was no mandate for policy experimentation, as in the previous cases). An organization, Arch Grants emerged from several failed past attempts to revitalize the city. This nonprofit organization reunites public and private stakeholders, coordinating their efforts and resources, and providing support to entrepreneurs. Arch Grants model, that is based on a competition between entrepreneurs for winning a monetary prize and several support services, is itself regarded as an experimentation (Motoyama & Knowlton, 2017), not being clear what it will evolve to.

4.4.2 Evidence of EEPs adaptation to a high level of uncertainty

In Ontario the uncertainty about the evolution of the EE was addressed by a successive evaluation and review process of the EEPs (Bramwell et al., 2019), thus EEPs were continuously adapted to cope with the evolution of the ecosystem and exogenous factors that were unforeseen. The open mandate, vague directives and adaptation to local context delivered a "mix of flexible program design, policy learning and program adaptation represent a unique policy approach" (Bramwell et al., 2019, p. 278). Such characteristics are very much in line with the effectual logic and emphasize the capacity to accept and effectively cope with uncertainty.

The RTP is also referred as an example of how an ecosystem may be successfully developed, despite the high level of uncertainty, when governments adopt creative solutions, motivate stakeholders and marshal resources towards the development of an EE (Feldman & Lowe, 2018, p. 339). From the 50's on there were several high-risk options, governments through EEPs promoted a development model based on technological development and a specialized workforce, rather than low wage work. Since the results and future trajectory of technology development is uncertain, as well as the market for those technologies, prediction is ineffective. Thus, instead of planning "with perfect foresight the capricious decisions, the best that local policymakers can do is continuously search for meaningful action" (Feldman & Lowe, 2018, p. 349).

In Malta the proximity of institutional actors, companies and even its inhabitants provided a capacity to adapt faster than it would be possible in a larger community (Yamamura & Lassalle, 2020). This capacity was crucial for the development of effective EEPs that enabled the development of the EE in a small island state and in a highly competitive area (gamming).

4.4.3 Policies and stakeholder networks

Throughout the whole description of the Ontario EEP development, there is a clear demonstration of a particular focus on developing stakeholder networks. Since the early stage "parties were encouraged to organize into regionally based "partnerships" or "consortia" to submit proposals for funding" (Bramwell et al., 2019, p. 279). A network of support organizations was built to provide services to entrepreneurs, the ONE network provided multiple services. But this network was also intended to intermediate and coordinate the interconnections between different stakeholders and local ecosystems, in other words, building and strengthening the ecosystem's networks (Bramwell et al.,

2019). Therefore, developing stakeholder networks is pivotal to EEP in Ontario, and exhibits a parallel with the development of the effectual network and the "crazy quilt" that are key elements in an effectual process (Sarasvathy et al., 2014). Further, these partnerships allow government (central and regional) to manage the EE much as a "pilot-in-plane", focusing on addressing the evolution of the ecosystem, with a flexible approach, continuously learning and adapting EEPs.

In St. Louis the development of the EE also relied in Arch Grants, a nonprofit association that is mostly funded by public sector organizations. However, nonprofit organizations and private sector stakeholders also integrate the organization, that as in the Ontario example not only provides services to entrepreneurs but more importantly congregates the efforts and resources of over 50 stakeholders (Motoyama & Knowlton, 2016). Arch Grants not only illustrates the key role stakeholder networks, it also contributed to the development of other ecosystem networks (Motoyama & Knowlton, 2016, 2017).

In Malta, the development of stakeholder networks were facilitated by the proximity and overlapping networks the result from the smallness of the island. The EEPs successfully developed these networks, thus compensating several disadvantages, that were induced by the size and limited available resources, with adaptability and proximity but also culture that provided a common mindset (Yamamura & Lassalle, 2020). Several institutional actors developed a support network that was effective in coordinating efforts, attracting and supporting entrepreneurs. EEP interventions aimed at attracting investors from other sectors (e.g., construction, tourism) (Yamamura & Lassalle, 2020), exhibit a correspondence with the resource expanding cycle, and the effectual principles namely the "crazy quilt", the "bird-in-hand" (Sarasvathy et al., 2014).

4.4.4 Ecosystems policies and limited resources

Ontario and Canada are not exactly a scarce resource context since the region is the industrial heartland of a developed and thriving country. Nevertheless, there is evidence of insufficient funding for the implementation of EEPs and restrictions in available financing for new ventures (Bramwell et al., 2019). Funding through the Investment Accelerator Fund had to involve different stakeholders to expand the amount of available funding (Bramwell et al., 2019). Resorting to partnerships (effectual network) to expand resources is also a characteristic of effectual approaches. Additionally, the concern with effectively leveraging extant research infrastructure (Bramwell et al., 2019) is aligned with the "bird-in-hand" effectual principle, an approach that departs from questioning what can be done with the available resources.

In St Louis there was no abundance of resources, to revitalize the city and its EE it was necessary to reunite the efforts and resources of many stakeholders (Motoyama & Knowlton, 2016). Arch Grants incorporates much of what the "crazy quilt" and the "affordable loss" principles mean in an effectual process. By themselves and relying only in public funding, support organizations were not able to develop the EE. Thus, the solution emerged from establishing partnerships that enabled a joint effort between stakeholders, this was one of the crucial roles of Arch Grants (Motoyama & Knowlton, 2016). This process is also present in the RTP ecosystem, with the public private cooperation being a crucial element to provide funding in different stages (Feldman & Lowe, 2018).

Malta's ecosystem developed in an environment of resource scarcity, intensified by being a very small island country. Nevertheless, it provides a good example of how focusing on endogenous resources and effective mobilization of local stakeholders is possible to develop a competitive advantage (Yamamura & Lassalle, 2020). In this case

the "crazy quilt" and the "bird-in-hand" principles but also the resource expanding cycle (Sarasvathy et al., 2014), were supported in the proximity of the EE's actors and the existing mutual help culture.

Next, to reinforce our empirical illustration, we present (Table 2) a summary of the actions associated to effectuation by adapting Fisher's (2012) work to summarize the actions related to effectually approaching EEPs. Following the structure of Fisher's (2012) example these are condensed in four topics experimentation, affordable loss, flexibility and precommitments.

Effectuation – characteristic actions [22]	**Ontario**[23]

Experimentation
- Develops multiple variations of programs and policies, aimed at different actors and elements of the EE
  o creating experimental support programs
  o implementing different support policies
	"link different components of the provincial research infrastructure and technology transfer system into a coordinated whole while simultaneously allowing for structural variation according to local economic conditions"
	
	"important adaptations in program design and implementation have occurred in response to ongoing program reviews that represent reflexive policy learning about "what works" in different spatial and institutional contexts"
	
	"efforts by the provincial government to shape the "right mix" of policies to support the development and integration of entrepreneurial ecosystems"
	"the OCN network was designed to be adaptable to different sectors and market dynamics right from the outset. (…) the Ontario MRI was given an open-ended mandate to "think differently about things and to challenge traditional models and come up with some fresh thinking" "
	"Since then, each RIC operates as a not-for-profit organization mandated, and partly funded, by the MRI to deliver programs and services tailored to the needs of local entrepreneurs, start-up firms and researchers."

Affordable loss - Commits only limited amounts of resources to at a time, seeks out ways of doing things in inexpensive ways - Limits the resources committed to the EE development, developing policies that resort only to its own resources	The government had the purpose of leveraging "its extensive research infrastructure to more effectively support the province's innovation economy" (p 278) "a suite of funding programs was established which were cumulatively valued at $63m for the 2008–2009 fiscal year"
Flexibility - Responds to unplanned opportunities as they arise, rapidly changing the support policy when necessary - Adapts policies to the resources on hand, focusing on what is readily available when deciding on a course of action - Avoids courses of action that restrict flexibility and adaptability, rejecting courses	"began experimenting with a place-based policy framework that has been progressively refined and expanded over time to support the development of technology-based entrepreneurial ecosystems" "supports commercialization and entrepreneurship activities according to local context" "openness and flexibility with which it was undertaken, and the horizontal and vertical knowledge sharing involved"

[22] Adapted from Fisher's (2012) study.

[23] Citations from (Bramwell et al., 2019) that evidence effectual characteristics (we added underlining)

of action that will compromise flexibility in the future	"Ontario government allowed its policy makers to adjust program design and revise the policy approach based on feedback both from practitioners in the field and the study of "best-in-class models for innovation in Ontario""
Precommitments - Enters into agreements with different EE stakeholders, e.g., entrepreneurs, and other organizations, negotiating prior to having a fully developed ecosystem	"Interested parties were encouraged to organize into regionally based "partnerships" or "consortia" " "publicly funded province-wide network of entrepreneurial support organizations not only delivers services on a regional basis but also function as intermediaries tasked with building networks within and across regional innovation ecosystems" "a province-wide network of 11 innovation intermediaries (…) "multi-stakeholder, regional development organizations" established with the vague directive to "support partnerships among business, institutions and local governments to promote innovation" "

Table 4-2 - Characteristics of an effectual approach

4.5 AN EFFECTUAL APPROACH TO ENTREPRENEURIAL ECOSYSTEMS POLICIES

In the previous sections we have established a link between the effectual approach and EEPs. We have also provided an empirical illustration of effectual features in EEPs. Building on our arguments, the propositions and the examples we now combine the effectuation process model (Sarasvathy, 2008; Sarasvathy et al., 2014) and an EEP process (Stam, 2018)24 that uses a predominantly causal approach. The purpose of this synthesis is to move forward from demonstrating the adequacy of the effectual approach to EEP, towards theorizing in what way effectually approaching EEPs positively impacts the process and its results.

[24] We selected Stam (2018) model because it was specifically designed for EEPs, by a highly cited author in the field. The model is also in line with what is proposed by other authors e.g. (Arshed, 2017; Arshed et al., 2014; Smallbone, 2016)

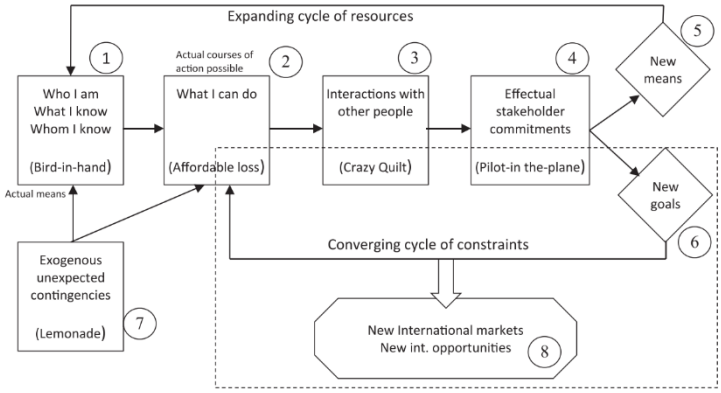

Figure 4-1 Effectuation (Sarasvathy et al., 2014)

Phase			Monitoring
I	Diagnosis of the entrepreneurial ecosystem	Objective data of the ecosystem elements, its overall strength, output and outcomes	T0
II	Debate on the diagnosis	Conversation with stakeholders about the strength of the ecosystem and its elements	
III	Selection of policy target(s)	Focus policy attention on leverage points, weakest links	
IV	Selection of policy instrument(s)	Consult policy catalogue of available policy instruments to achieve policy target	T1
V	Implementation of policy instrument	Stakeholder engagement for implementation	T2
VI	Impact evaluation		T3

Table 4-3 Phases in entrepreneurial ecosystem policy process (Stam, 2018)

We explore the contrast between a causal and an effectual approach that emerges from comparing both models to develop our synthesis. Bearing in mind both approaches are not opposite or mutually exclusive but complementary (Sarasvathy, 2001; Sarasvathy & Dew, 2005). It has been argued using both will increase the capacity to engage in a wider scope of activities and compatibility with other stakeholders(Chandler et al., 2011; Grégoire & Cherchem, 2020).

4.5.1 EE Diagnosis

Both causal and effectual process begin with a diagnosis. However, there is a significant difference in its scope, focus and purpose. A causal approach[25] begins with a thorough diagnosis (Stam, 2018) aiming to identify existing opportunities with the purpose of predicting the future evolution and outcomes, and develop an elaborate plan to achieve them (Fisher, 2012; Sarasvathy, 2001). The diagnosis may be followed by a debate to refine the obtained data and results (Stam, 2018), this is consistent with the predictive focus of the causal approach.

On the other hand, the effectual approach also begins with a reflection (Who am I? What do I know? Whom do I know?). In this case the process is simpler and more expedite, since it addresses only the available means, the bird-in-hand principle (Sarasvathy, 2001). The purpose is also different, there is no need, at this stage, to establish goals and expected returns, these emerge and are constantly adapted through a process of iterative learning and experimentation, following the affordable loss and lemonade principles (Fisher, 2012). Thus, contrary to the causal approach, at this stage, indicators and measures are not crucial since the commitment of resources, especially in early stages of development, will be limited, operating under the affordable loss principle (Sarasvathy & Dew, 2005). This however, does not mean an effectual approach should not be controlled or affect resources with caution, in order to provide results (Welter & Kim, 2018). In fact, the focus of effectual approach is control.

Additionally, we suggest, exogenous contingencies should also be considered in the diagnosis. Furthermore, effectually approaching contingencies may bring some advantages, by regarding them as chances to innovate and grow (lemonade) instead of

[25] In this section for the sake of parsimony we will refer to Stam's (2018) model as causal.

restrictions to the scope of the intervention (Sarasvathy et al., 2014) as they are usually considered in a in a causal type of diagnosis.

At an initial stage of EE development there is usually a very high degree of uncertainty. The complex and adaptative nature of EEs and high sensitivity to initial conditions (Roundy et al., 2018) limits the capacity to make accurate predictions on the forthcoming results of EEPs. Therefore, building on propositions 1 and 2 we suggest this stage should be developed as to include the two initial stages of the effectual process. Namely focusing on endogenous resources or means at hand, according to the bird-in-hand principle, and what to do with those means, according to the affordable loss principle. Additionally exogenous constrains addressed effectually will allow the development of a wider set of EEPs. This will allow more agile and adaptable intervention in EE development and a need for less engagement of additional resources.

4.5.2 Interaction/Debate with stakeholders

This stage has much in common in both approaches. The causal approach focusses on selecting stakeholders representative of the elements of the EE and entrepreneurs already present in the EE (Stam, 2018, p. 6). The rationale of this stage is debating the diagnosis provides a tool for improving its accuracy. In turn it will improve the quality of the prediction, this is crucial under a causal logic (Fisher, 2012).

The effectual approach, on the other hand focus on engaging with the people they know, in this stage the purpose is to understand what can be done with what is available (Sarasvathy & Dew, 2005). This means the opportunity or "product" may not be defined, this is consistent with the effectual logic that does not require very detailed vision to proceed (Jiang & Rüling, 2019) . It is an exploratory stage, the commitment of stakeholder

will only be defined in a later phase (Sarasvathy & Dew, 2005). This stage also has the important function of setting the ground for the development of the stakeholder self-selection process in the next stage (Sarasvathy et al., 2014).

Building on proposition 3 we suggest this stage should be developed as to include the crazy quilt stage of the effectual process. By including both perspectives the efficacy of the stages is enhanced.

The causal approach is important at this stage. In the causal approach a criteria and selection process seeks to identify those that are relevant (Stam, 2018). To understand how a complex system, such as the EE, emerges and evolves it is essential to identify and engage its key actors, the entrepreneurs in particular (Roundy et al., 2018).

On the other hand, by interacting with different stakeholders, entrepreneurs and nongovernmental institutions, governments and local authorities can explore a multitude of possibilities. Following the crazy quilt principle, it is crucial to begin to forging as many partnerships as possible and avoid discarding courses of action that hinder the capacity to adapt and follow viable solutions (Jiang & Rüling, 2019; Sarasvathy et al., 2014). One example is the fundamental role of coordination between public and private sector for EEPs and the success of the ecosystem (Candeias & Sarkar, 2022; Isenberg, 2010). Additionally, by eliminating the need for identification and selection of stakeholders the process gains in speed.

Therefore, we suggest a mixed approach at this stage. Consisting of a simplified and more expedite discussion with key actors, identified in the diagnosis. Complemented with a broader exploration of existing connections.

4.5.3 Stakeholder commitment

Once again, this stage is common to both approaches. However, the sequence and characteristics are diverse. In the causal approach it occurs after a selection of policy targets and instruments, and the purpose is to dialog with stakeholders and seek their commitment and insights (Arshed et al., 2014; Stam, 2018). This means stakeholders are called to help implement a policy that is previously decided in most aspects. And only a selected group of stakeholders is encompassed in this process.

Contrarily effectual approach seeks stakeholder engagement to define those targets and instruments. Stakeholders are an important element of the two cycles that continuously feed the process (Sarasvathy & Dew, 2005). Stakeholders not only actively feed and condition what is developed and implemented as their resources are fundamental for the process (Fisher, 2012; Sarasvathy et al., 2014). Furthermore, the participation process is more organically implemented, desirably based on a self-selection of stakeholders that will provide an expansion of resources, this is crucial for reinforcing the "crazy quilt" (Sarasvathy et al., 2014). By eliminating the need to select stakeholders and focusing on those that are interested in the process, the effectual approach once more brigs agility to the process. Also ensuring it is more inclusive, encompassing a diversity of stakeholders, which enriches its results and opens paths that a classical planning process would not set off.

An important advantage of the effectually approaching the process is to bring new resources provided by each new stakeholder's network, and also new constraints that result from their agency (Sarasvathy & Dew, 2005). Regarding stakeholder participation, it is wise to take into account the issue of vested interests addressed by Stam's (2018) perspective of the process, making sure it does not negatively impact the development of EEPs.

Thus, an effectually approaching this stage implies a more active participation of stakeholders, these intervein actively in the definition of the targets and instruments. Thus the aims and targets emerge from the interaction and are continuously improved as a result of the two cycles of resource and constraints (Jiang & Rüling, 2019; Sarasvathy & Dew, 2005)

Therefore, we suggest this stage to occur right next to the interaction with stakeholders. And the selection of policy targets (goals) and types of policy (means) regarded as an outcome of this interaction. As already discussed, this provides at least three important advantages. First it strengthens stakeholder networks and as a result increases the set of available resources. Thus, in line with propositions 3 and 4, we hold that to effectually engage this stage, is advantageous for the success of EEPs and the development of ecosystems. Regarding its positive impact on the development of stakeholder networks and increase of resources, especially in scarce resource environments. Second the self-selection of stakeholders provides a more diversified range of solutions but also simplifies and allows a more expedite and adjusted dialog with stakeholders. One of the consequences of the high level of uncertainty that results from the EE's complex nature (Roundy et al., 2018) is the impracticality of accurately predicting the evolution of EEs and also EEP´s outcomes (Autio, 2016). Effectually approaching this stage downgrades the need for outcome prediction, and approaches problems with a logic that allows to navigate and benefit from the opportunities that emerge from uncertainty (pilot-in-plane) (Fisher, 2012; Sarasvathy et al., 2014). Thus, being in line with proposition 2. Third, it enables the two cycles of the effectual process to be established as a twofold adjustment process that goes further than a causal impact evaluation process.

4.5.4 Reshaping the EEP process

Figure 3 synthesizes the impact of effectually approaching the EEP process. By introducing features of the effectual approach, the process of developing and implementing EEPs gains in agility and adaptability. Agility by downgrading the role of prediction and providing a tool for responding more promptly to exogenous shocks. Adaptability induced by the effectual capacity to cope with uncertainty and contingencies (Fisher, 2012). Additionally, the two effectual cycles that continuously adjust policy instruments (resources) and policy target (constraints) and ensure the continuous adaptation. Well in line with the self-organizing and adaptative nature of the EEs as complex systems (Roundy et al., 2018).

EEPs also gain in efficacy and resilience. The effectual approach also provides a way to reinforce stakeholder networks and bring their resources and perspectives into the EE. The coalescence of efforts between different stakeholders of the EE is fundamental for its development (Roundy et al., 2018). Establishing and developing networks is an effective way to ensure it. And strong networks are fundamental for resilient ecosystems (Brown et al., 2017).

Condensing the set of arguments previously presented, we hold that incorporating elements from the effectual process and effectual logic into the EEP formulation and implementation process improve its efficacy, agility, and adaptability.

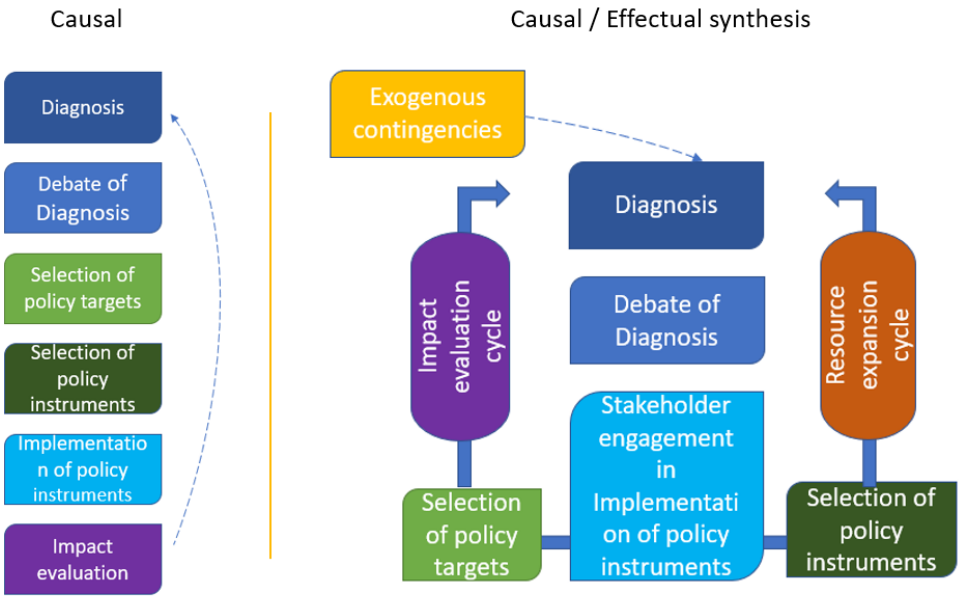

Figure 4-2 - Effectually reshaping EEPs

4.6 DISCUSSION

The EE provides an umbrella concept that integrates diverse literatures, where government and EEPs are relevant elements (Spigel, 2017; Spigel et al., 2020). Thus, EEs provide opportunities to explore new research paths, in policy-related issues (Wurth et al., 2021). The development of EEs requires new approaches to policy interventions, since the more conventional conceptualizations are unable to cope with EEs complexity (Feldman & Lowe, 2018). Extending the use of other theories and literatures that engage similar issues provide useful insights (Cobben et al., 2022) and a foundation for new approaches to the development of EEPs. Furthermore, the combination of different perspectives has proven useful for advancing knowledge particularly in complex contexts (Okhuysen & Bonardi, 2011). Our research follows this line of reasoning by resorting to a contrast between effectuation and causation to examine EEPs. Deemed an useful tool for describing the entrepreneurial process, effectuation is presently consolidated in

entrepreneurship research [cf. (Sarasvathy, 2001; Sarasvathy et al., 2014; Sirén et al., 2019)]. It has also been specifically applied to the study of different issues in EEs [cf. (Hubner et al., 2021; Miles & Morrison, 2020)]. Likewise, our work applies effectuation as a theoretical lens to examine a particular issue in EE research i.e., to improve our understanding of how governments and public sector organizations support EE development through EEPs.

We examined how well the characteristics of effectuation link with such interventions. A conventional perspective on EEPs would suggest, government interventions be preceded by careful planning and evaluating their expected value. Following this line of thought we might expect to observe a behavior of governments regarding EEPs that is more aligned with a causation approach, i.e., a planned development of the ecosystem, with clear preestablished goals. However, the formulation process of entrepreneurship policies remains unclear, and evidence suggests that in practice, these processes do not follow a previously defined, formal, linear methods (Arshed et al., 2014; Smallbone, 2016). Moreover, the efficacy of such interventions, that aim to increase entrepreneurial activity, has been questioned (Nightingale & Coad, 2014; Shane, 2009), as well as the type of policies and ventures that are supported by them (Brown et al., 2017; Stam, 2018). Adding to the previous, considering novel application of the EE concept and the complexity that characterizes ecosystems, it is necessary to find new ways to support EE development, EEPs must encompass processes of adaption and improvisation (Feldman & Lowe, 2018). It has been argued the effectuation perspective is relevant for EEs and its impact and role is contingent of the EEs specific context and in particular, its predominant narratives (Hubner et al., 2021). Furthermore, uncertainty is a driver for effectual behavior of entrepreneurs (Ghezzi, 2019) and ecosystems (Radziwon et al., 2022).

Governments with respect to their support to EE development through EEPs must frequently deal with some of the issues that effectual theory addresses. Thus, we hold that observing these interventions from an effectual point of view can provide useful insights, and ways to improve the process of EEP formulation and implementation. Thus, answering to calls for innovative conceptualizations of EEPs (Carayannis et al., 2022; Feldman & Lowe, 2018), our research provides a link between the effectual approach and EEPs. This connection is condensed into four areas that have relevant effects on EEPs: policy experimentation; uncertainty stakeholder networks and limited resources. We present four propositions, one for each area and provide empirical illustrations. We also propose a model for effectually formulating and implementing EEPs that offers several advantages when compared to the "conventional" model, more specifically a greater capacity for adaptation to the complex and self-organizing nature of the EE, to the level of uncertainty involved in EEPs and the effective use of endogenous (and scarce) resources.

The dynamic nature of EEs and the complex interactions between its elements and networks, seriously hamper any kind of prediction, therefore, become problematic for a causal approach to EEPs (Carayannis et al., 2022). Contrariwise, these favor the experimentation and improvisation in EEPs (Armanios et al., 2020; Feldman & Lowe, 2018). The high levels of uncertainty are a context where controlling may be more feasible than predicting. Hence, the characteristics of effectual logic are aligned with the formulation and implementation processes of EEPs. Furthermore, to succeed in developing the ecosystem EEPs must enable the development of networks, mobilize stakeholders and ensure an effective allocation of resources towards productive entrepreneurship (Brown & Mason, 2017; Stam, 2015) that find a correspondence in the effectual approach regarding the need to mobilize the community towards

entrepreneurship and economic growth, building stakeholder networks, thus taking action to overcome resource constraints through the creative use endogenous resources (Fisher, 2012). Naturally, this creative use of endogenous resources is more relevant in scarce resource environments (Yamamura & Lassalle, 2020)

On the other hand, the effectual way of reasoning allows a very different perspective e.g., if we make use of the affordable lost principle we do not need to worry too much about the cost, given our bounded cognition capacity, this allows a greater scope for innovation (Sarasvathy & Dew, 2005). Particularly in the case of EEPs, since the complex and dynamic nature of the EE does not allow a very accurate cost/benefit estimation (Carayannis et al., 2022); one possible strategy is risking less resources and focusing on finding an acceptable solution, rather than wasting precious resources in a fruitless search for an optimal solution (Sarasvathy & Dew, 2005). Thus, in our model of effectually developed EEPs we propose a simpler diagnosis stage that incorporates the principles of effectual logic.

The focus on developing stakeholder networks of the effectual process is transposed into the EEP process in the interaction and commitment with stakeholder stages. This is relevant since enabling the coalescence of efforts of a vast array of EE elements and a continuous injection of resources is fundamental for the development of the EE (Roundy et al., 2018). By enhancing the development of stakeholder networks there is a lesser need for affecting public resources. It also creates a propitious environment for developing more creative and adaptable solutions for EEPs. Last but certainly not least, instead of a classic policy evaluation cycle, we suggest adapting the two cycles of the effectual approach will provide a better adjustment of the EEP targets and expand its policy resources.

4.7 CONCLUSION

Advancing the EE research agenda requires going beyond the identification of attributes and interconnections (Spigel, 2017). Our work answers to calls for advancing theoretical development of EE research (Autio et al., 2018; Cao & Shi, 2021; Spigel, 2017), namely by offering new insights, supported by the extension of the use of other management theories and literatures that engage similar issues (Cobben et al., 2022).

Following this line of thought, the purpose of this article is to improve the understanding of policy interventions to support EE development through EEPs, we hold that effectuation theory provides an adequate theoretical framework to describe, and to improve the process of EEPs formulation and implementation. Effectuation is an established theory in entrepreneurship research and has been progressively extended to the study of EEs. However, to our knowledge never to specifically study EEPs.

Our findings support the link and the adequacy of effectually developing and implementing EEPs. Experimentation, uncertainty, stakeholder networks and scarce resources are areas where EEPs share common characteristics with the effectual approach. Therefore, effectually developing and implementing EEPs may benefit from insights from the effectual theory and enhance its effectiveness by adopting a similar method.

This study is positioned at an early stage of theory development, where the focus is set on outlining concepts and conveying those into propositions that lay the foundations for empirical testing (Witell et al., 2017), subsequent validation and empirical generalization (Akbar, 2019). This represents a promising path for advancing research, where the examples used in the empirical illustration should be expanded and empirically testes in new contexts, namely emerging economies.

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CHAPTER 5

TAOBAO VILLAGES- AN AFFORDANCE PERSPECTIVE ON THE EMERGENCE OF ENTREPRENEURIAL ECOSYSTEMS VIA DIGITAL PLATFORMS

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Abstract

Entrepreneurial ecosystems (EE) have grown in popularity in the entrepreneurship literature. However, despite the rising interest from academics, policymakers and practitioners research development has overlooked some relevant questions. We address one of these questions, the impact of digital technologies and specifically digital platforms in the development of EEs. Digital platforms have important effects on entrepreneurial activity and processes. These effects are extensive to different levels and also across levels. However, the latter have been insufficiently addressed by literature and lack empirical illustration. We address these gaps using the affordance theory as our theoretical lens. Our research provides an empirical illustration of the link between the individual entrepreneur and the ecosystem level that digital technology affords. Using the emergence of Taobao village ecosystems as a backdrop for our research, a rural area in an emerging economy. Taobao villages emerged from affordances, made possible by the

interaction of digital artifacts and entrepreneurial agency. Two main types of affordances, individual agency affordances and community level affordances are present in Taobao villages. Additionally, from these multiple affordances emerged another type of EE actors, the complementors. Our empirical evidence offers a more holistic perspective on influence of digital technology and the evolution process of EEs.

Keywords: Affordance, entrepreneurial ecosystem, digital technology, platforms, Taobao

5.1 INTRODUCTION

The study of entrepreneurial ecosystems (EE) has grown in popularity within the entrepreneurship literature. Clusters of entrepreneurial activity forming evolving ecosystems have captured the attention of many scholars (e.g., Autio et al., 2018; Feld, 2012; Isenberg, 2010; Spigel, 2017; Stam & van de Ven, 2021). EEs are local environments defined by complex interactions among entrepreneurs, businesses, and policy makers, that promote venture creation and performance. These complex interactions convey into "spikes" of entrepreneurial activity (Brown & Mason, 2017), that over the course of their evolution can generate significant economic growth by creating a dynamic and sustainable process, a virtuous cycle of entrepreneurship (Malecki, 2018). The prospects of economic growth and job creation have naturally attracted the attention of many governments and local authorities, granting high levels of public support (Nightingale & Coad, 2014).

However, despite the rising interest from academics, policymakers, and practitioners, who has generated a veritable boom in the nascent EE literature, there are multiple areas that need to be addressed (Candeias & Sarkar, 2022). A relevant and emerging area of research examines the impact of digital technologies in the development of EEs, in particular the influence of digital platforms (Elia et al., 2020; Nambisan et al., 2019; Song, 2019). A small and emergent group of scholarship are beginning to heed and to call for a better understand the implications of a 'digital technology perspective' of entrepreneurship, that EE literature had until recently overlooked (Nambisan, 2017).

Digital technology, at best, has been regarded as a part of the context, overlooking its influence in such germane questions as entrepreneurial agency and entrepreneurial processes (Nambisan, 2017). Digital technologies expand the scope of entrepreneurial opportunities by providing access to a wide range of markets and users (Zahra et al.,

2022). The dearth of insights regarding the link between entrepreneurship and digital technology, represents a notable gap considering the relevance and pervasiveness of both (Song, 2019; Sussan & Acs, 2017).

Digital platforms can have relevant impacts on entrepreneurial processes and entrepreneurial activity. Platforms provide low-cost access to numerous opportunities, being a fertile ground for entrepreneurs (Kraus et al., 2019; Nambisan et al., 2018). They also affect entrepreneurial processes at different levels (individual, organization, ecosystem), and also across levels, however, the latter have not been sufficiently addressed by literature (Nambisan et al., 2019; Nambisan & Baron, 2021). Furthermore, extant research has barely observed and provided empirical illustrations of the link between the individual agency and the opportunities digital technology and particularly platforms afford, this gap is extended by a predominant consumers' perspective in digital platform studies from other research areas (Leick et al., 2022).

Our research addresses these overlooked questions that generate relevant gaps in knowledge of EEs promoted and impacted by digital technologies. We study the effects and link across different levels and taking the entrepreneurs' perspective on the impact of digital technology. As Autio et al. (2018, p74) have suggested the EE "harnesses technological affordances to facilitate entrepreneurial opportunity pursuit by new ventures". Similarly, Nambisan et al. (2019) regard affordances a key theme in the transformation of entrepreneurship, as a result of the growing "infusion" of digital technology. Following Autio et al. (2018) and Nambisan et al. (2019) line of thought we make use of the affordance theory as our theoretical lens to examine the impact on entrepreneurial activity and on the entrepreneurial process created by digital artifacts (high speed internet and digital platforms). Affordances are different action possibilities that the environment affords to an agent, an "epitome of the ecological approach" (Gaver,

1991, p. 79). The use the of the theoretical lens of affordances to understand the growth of EEs, builds upon recent theoretical insights provided by scholars around examples such as, coworking spaces, venture accelerators and makerspaces fostered by digital technology (Autio et al., 2018; Nambisan, 2017).

We strive to address the aforementioned, crucial gaps while providing an empirical illustration of the link between the individual entrepreneur and the ecosystem level that digital technology (internet and digital platforms) enable. The surge of entrepreneurial clusters in rural China, the phenomenon of 'Taobao villages' provides the empirical context from which we address our central research question ''What role do affordances play in the birth of the Taobao villages"? Answering this question contributes to a broader scholarly understanding of objective, actor-independent factors in ecosystem creation and does so in a context still underexplored by EE research.

Our research makes at least three contributions. First, we address the profound impact of digital technology in entrepreneurial processes and particularly the creation and development of EEs (Nambisan, 2017; Song, 2019). Not so long ago, the core of EE literature still disregarded its importance or deemed it as a component of the local context (Autio & Cao, 2019).However, as argued by Nambisan (2017), technology has become one of the threads from which the fabric of organizations is now woven, and there is an urgent need to start "theorizing the role of specific aspects of digital technologies in shaping entrepreneurial opportunities, decisions, actions, and outcomes" (2017, p. 1030). Hence the impact of digital technology should merit more attention from scholars (Song, 2019; Sussan & Acs, 2017) and in particular address issues such as digital platforms (Srinivasan & Venkatraman, 2018; Yun et al., 2017) and technological/digital affordances (Autio et al., 2018; Majchrzak & Markus, 2013).

Second, our theorizing follows the line of research developed by (Autio et al., 2018; Nambisan et al., 2019; Autio & Cao, 2019) extending the use of the theoretical lens of affordances to the study of the influence of digital technology in the development of EEs. By using affordances as a theoretical lens, we answer to calls for theoretical advancing EE research through further "theoretical treatments" (Autio et al., 2018, p. 73) and the use of theoretical frameworks that offer a better understanding of the emergence and dynamic evolution of EEs (Spigel, 2017). Both concepts are deeply rooted in ecology thinking. Hence, we hold affordances 'characteristics provide a useful theoretical lens for the study of EEs at least for two reasons. On the one hand, affordances imply a complementarity between actors and environment (Gaver, 1991), this describes a similar mechanism to the co-evolution process, between entrepreneurs and the ecosystem and the resulting mutual adaptation that characterizes the development of EEs (Scheidgen, 2020) and sheds light on the interconnections across levels, so far overlooked in the literature (Nambisan et al., 2019; Nambisan & Baron, 2021). On the other hand, examining groups of affordances allows us to unveil the mechanisms behind complex actions that may be sequential and spatially nested (Gaver, 1991). This is well aligned with EEs since they are a place-based (hence nested) phenomena (Audretsch & Link, 2019; Wurth et al., 2021), and evolve in time according to a sequential, though not linear process (Mack & Mayer, 2016).

Finally, our theorizing offers an important contribution by providing an illustrative case an emerging economy as a backdrop, thus providing a valuable contribution extending our understanding of EE emergence and does so outside richer settings (Cao & Shi, 2021; J. Chen et al., 2020; Lorenzen, 2019). Digital technologies hold the potential for the development of products and ventures, which are less bounded by location, and hence can be a source of entrepreneurial opportunities for rural areas (Haefner &

Sternberg, 2020). However, EE research is mainly focused on mature economies and successful EEs and neglecting the study of ecosystems in emerging economies and in a broader context in rural regions. This is a relevant issue in literature that hinders the theoretical development and practice of EE research. On one hand, the effects of resource munificence on the development of new ventures are not clear and have been questioned (Amezcua et al., 2013; Motoyama & Knowlton, 2016). On the other hand, entrepreneurship and EEs in poorer regions have different characteristics and face diverse challenges (Miles & Morrison, 2020; Xu & Dobson, 2019) that cannot be ignored. Factors that influence the development of entrepreneurial activity in these contexts may not fit the same foundations as its counterparts in developed economies (Qi et al., 2019). Taobao villages illustrate the importance of digital technology and in particular platforms for the development of rural areas (Wu et al., 2010). Our analysis unveils the processes behind the development of Taobao villages as a type of EE that built on affordances developed by grassroot efforts in using digital technologies (Leong et al., 2016).

The remainder of this paper is organized as follows. We first summarize the theoretical background of EEs and affordances, followed by a section containing a description of the Taobao villages and its evolution. In the fifth section we present our empirical evidence organized according to individual and community level affordances. Finally, we discuss our results and present the conclusions of the study.

5.2 THEORETICAL BACKGROUND

5.2.1 Entrepreneurial Ecosystems

The use of the term “entrepreneurial ecosystem” is relatively recent and was generalized over the last decade (Alvedalen & Boschma, 2017; Stam, 2015). However, its adoption became more predominant only from 2016 onwards (Malecki, 2018). The EE concept derives from of the ‘ecosystem’ first used by Tansley (1935) in biology (Cavallo et al., 2019). Starting with Moore's (1993) introduction of the term “ecosystem” in the context of competitive dynamics, the link to biological ecosystems theoretically embeds a preparedness to consider complex interactions and interdependencies as shaping EEs (Brown & Mason, 2017). In the entrepreneurship literature, EE was introduced by seminal articles by Cohen (2006)[26], Isenberg (2010) and Feld (2012).

The EE concept’ link to the fields of evolutionary biology and ecology, suggests tangible insights into the functioning of economic clusters (Audretsch et al., 2019). EEs bear resemblance to other previous concepts such as “knowledge clusters,” “industrial districts,” “innovative milieus,” and “regional” and “national systems of innovation” (Arikan & Schilling, 2011; Crevoisier, 2004; Doloreux, 2002; Pyke et al., 1990; Tallman et al., 2004). Unlike national or regional systems of innovations, in which government at either a state or subsidiary level plays a key role, EEs are environments characterized by entrepreneurial opportunity discovery and pursuit (Ács et al., 2014), in which entrepreneurs and their ventures are the central agents (Acs et al., 2017; Autio et al., 2018).

The ecosystem approach offers a solution for two flaws in much entrepreneurship research. First, its excessive individualism focusing on the character of the entrepreneur

[26] Cohen (2006, p. 6) defined EE as “an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures”.

and those specific entrepreneurial traits deemed to be associated with success in this sphere (Gartner, 1989). Second, the lack of a truly systemic perspective in the sizeable entrepreneurship research focused on the role of entrepreneurs as change agents (Alvedalen & Boschma, 2017). The EE lens provides insights into the complex dynamics of entrepreneurship through systemic-perspective research concerning the prevalence and performance of entrepreneurship (Stam, 2015). The concept provides relevant insights on the clustering of entrepreneurial activity (Brown & Mason, 2017; Mason & Brown, 2014), focusing on entrepreneurship as an output of the ecosystem (Stam, 2015).

However, given the strong policy implications of EEs, not surprisingly, practitioners have played a dominant role in the development of the EE literature (Autio & Cao, 2019). One consequence has been that the concept "has so far been constructed *ad hoc* by different authors, without any shared definition" (Stam, 2015, p. 1765). Developed mainly from two "lineages" of regional development and strategy, also rooted in ecological systems thinking (Acs et al., 2017, p. 1). The first engaged in the study of differences in regional performance and second in different systems' propensities for value creation. A second consequence is the lack of theory development. EE research is deemed as "largely atheoretical and static" (Cao & Shi, 2021, p. 75), undertheorized and practitioner centric (Autio et al., 2018). Consequently, theory development has lagged behind practice (Spigel & Harrison, 2018; Stam, 2015) restricting the fields coherence and theoretical development.

The study of the impact of digitalization in EEs has also been lagging behind its implementation (Autio et al., 2018), mostly overlooking the overwhelming impact of digital technology in EEs (Cavallo et al., 2019; Elia et al., 2020; Sahut et al., 2021). Despite digital technologies' importance, and the adequacy of the EE concept to provide valuable insights on their impact (Autio et al., 2018). This can be achieve, mostly by

allowing researchers to reconceptualize value creation from the perspective of digital resources and actors and examine their interrelation along the evolution of the EE (Nambisan, 2018).

5.2.2 Affordances

The concept of affordance has its origins in developmental psychology and took shape especially in the hands of James Gibson (1966, 1979) who first coined the "made up" term (1979, p. 127), considering "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. (...) These affordances have to be measured relative to the animal" (1979, p. 127). Affordance, as Gibson develops it, describes the range of possibilities offered or afforded by an environment to a perceiving being (Gaver, 1991). The term has since migrated to fields as diverse as design, ecological psychology, information systems, anthropology, archaeology, architecture, complex systems, ethnology, film, musical performance, musical appreciation, philosophy, sociology, and communication studies, (James J. Gibson, 2014; Parchoma, 2014). Gibson considered that affordances might exist independent of an ability to perceive the possibility but that they had to be enacted by an agent if the possibility was to be realized (McGrenere & Ho, 2000). The concept of affordance is thus phenomenological- an affordance is a real possibility, but it has to be perceived as such, in terms of the possibilities it affords.

Later scholars further refined this idea to introduce a more relational and holistic contour, to include an agent's *capabilities to perceive,* and use what the environment has to offer (e.g., Cesari et al., 2003; Chemero, 2003; Fiebich, 2014; Jing & Van De Ven, 2018; Leonardi, 2013). Doing so clarifies that an affordance, to be enacted, can only be

so relationally, by perceiving an agent's "action possibilities that depend on one's own action capabilities (the 'animal relatum') in relation to particular aspects of the ecological environment (the 'environment relatum'), including physical, intentional, and institutional aspects" (Fiebich, 2014, p. 151). Perception and capabilities are also stressed by McGrenere and Ho (2000), who identify two pathways of variance of affordances. On one hand is the ease with which an affordance can be undertaken, and on the other hand the clarity of perception that grasps the possibilities of the affordance perceived.

Affordance proffers a dynamic framework "that moves with shifting material and cultural landscapes" (J. L. Davis & Chouinard, 2016, p. 247), in which different actors may actualize affordances differently (Volkoff & Strong, 2013). Technology artefacts clearly have affordances- the affordance of an in-built camera in a mobile device connected to the Internet affords entrepreneurs opportunity to develop possibilities such as TikTok or educational opportunities (Lloyd, 2018). Researchers investigating user-technology relationships in terms of "what users can do with a technology" (Markus & Silver, 2008, p. 612) can come up with a surprising range of ways of working with a technology, such as a mobile Internet enabled device (Mukherjee et al., 2017). An affordance perspective on technology, recognizes how a technology artefact can favor, shape, or create possibilities of use by actors. The actant's possibilities depend on the perceptions of the actors handling or otherwise accomplishing actions with the artefact. Thus "technologies can be understood as artefacts which may be both shaped by and shaping of the practices humans use in interaction with, around and through them" (Hutchby, 2001, p. 444).

Where technology is an enabler, an affordance lens represents a relational approach to understanding how economic (and social) agents interact, however, it does not place the technologies in the foreground (Leonardi, 2013; Leonardi & Vaast, 2017).

Technologies can afford activities (but may also imply constrains); hence, they play a fundamental, enabling role offering agents 'action possibilities'. As Parchoma (2014, p. 361) states, "affordances neither belong to the environment nor the individual, but rather to the relationship between individuals and their perceptions of environments".

Taking a cue from how digital technologies can create new affordances radically shaping the scope and the nature of distributed entrepreneurial agency (Majchrzak & Markus, 2013; Nambisan, 2017; 2018; Zammuto et al., 2007), Autio et al. (2018, p. 74) suggested an affordance perspective with which to consider EEs as a conceptual model that facilitates an "economy-wide redesign of value creation, delivery and capture processes". Digital technologies offer three types of digital affordances: decoupling between form and structure; disintermediation which reduces the power of middlemen in value chains, as well as generativity facilitating the coordination of geographically dispersed audiences. Entrepreneurial spaces, such as hackathons, accelerators, or makerspaces, have emerged to facilitate the exploit of digital affordances. And in turn EEs develop from entrepreneurial opportunity exploits of these technological affordances.

Consequently, it is the exploitation of the relationships among entrepreneurs and between them and the affordances offered by technology, that determine how value is created, delivered, and captured in an EE. Digital technology affordances provide an "architecture of participation" for distributed entrepreneurial agency (Nambisan, 2017), potentially explaining why, how, and when what technologies become enrolled in and affect EEs dynamics. Nambisan (2017, p. 1035) suggests that as a result of the 'infusion' of digital technologies "the locus of entrepreneurial agency has become less predefined and more diffused (or distributed), wherein a dynamic and often unexpected collection of actors with diverse goals and motives engage in the entrepreneurial initiative". The spaces

that compose EEs become crucibles of serendipitous possibilities in which surprising affordances and opportunities for their exploitation emerge. Digital affordances are not bounded by spatial borders (Nambisan, 2017; 2018), inversely EEs localized environments. Therefore, digital affordances are likely to have an impact on the EE´s spatial affordances (Autio et al., 2018). Exploring existing affordances and developing new ones is essential for the development of new ventures and the EE itself, this capacity simultaneously determines and is conditioned by the evolution process of the ecosystem (Zahra et al., 2022).

In developing an affordance mechanism to explain how EEs enfolds, we follow those authors (e.g., Fox & McEwan, 2017; Leonardi, 2013; Nambisan, 2018; Norman, 1999; Rice et al., 2017) that perceive affordances not as technological determinants, but as intermediating the space between technology and users' perceptions and capabilities. Hence, affordances should not be seen as exclusive properties of either artifacts or people but are constituted in relationships between what the agent perceives the artifact affords, framed by the agents' goals and capabilities, as well the as context (Ellison et al., 2014; Hutchby, 2001; Leonardi, 2013). Therefore, the use of an affordance is actor subjective, with different actors perceiving that a given technology artifact can provide distinct action possibilities (Ellison et al., 2014). Action possibilities and the actor's perception are also influenced by the context (Autio & Cao, 2019; Ostern et al., 2020; Volkoff & Strong, 2013) for this reason different places that entangle diverse subjectivities and technologies can develop into creative ecologies.

There are various merits of using an affordance approach (Xiayu Chen et al., 2020; Hutchby, 2001; Koroleva & Kane, 2017; Treem & Leonardi, 2012) for EE. First, focusing on affordances rather than exclusively on either material determinism, where entrepreneurial action is primarily due to technology, or social determinism, where it is

enacted due to social construction and agency, we can develop a theory of sociomaterial dynamics. Thus, what unfolds from our analysis is that both material and social agency are two important components of the same phenomenon. Second, by focusing on affordances, we can overcome the material determinism 'trap' in which arguments are developed based after the fact, in a functionalist account, of the emergence of a specific technology, aspects of which may change, thus contradicting theoretical hypotheses. Third, using the affordance lens enables us to employ a framework in which mechanisms can be described in terms of the processes that underlie relationships between causes and effects (Gross, 2009). Theorizing that addresses underlying mechanisms is particularly appropriate for process-oriented, phenomenon-driven innovation in the context of economic change that involves technology (e.g., G. F. Davis & Marquis, 2005; Henfridsson & Bygstad, 2013; Henfridsson & Yoo, 2014).

5.2.3 One Village at a Time: Taobao villages

Considering the relevant and understudied role of digital platforms in the emergence and evolution of an EE, their impact on entrepreneurial processes and the connection between entrepreneurs and the ecosystem (Elia et al., 2020; Nambisan, 2018), we use the Taobao villages in rural China to illustrate our theoretical conceptualization of how EEs are shaped by digital platforms. With the accelerated penetration of highspeed internet in rural China, a new and distinct entrepreneurial phenomenon has risen in rural China, that of 'Taobao Villages'. The exponential growth of China's e-commerce has enabled the Chinese not only to buy online but also for platforms such as *Taobao.com* (owned by Alibaba) to create new opportunities for entrepreneurs and small businesses to sell their products online. Opening an online store entails no fees, nor do platforms take any cuts

taken from online transactions, unlike Amazon.com (Qi et al., 2019). Rural Chinese leveraged the digital affordances to sell, and the phenomenon of Taobao villages quickly flourished. *AliResearch*, the research arm of *Alibaba Group*, considers as Taobao villages those where at least 10 percent of the households engage in e-commerce (or where there are at least 100 active e-shops, with annual online sales of at least 10 million yuan (or $1.5 million), (Luo & Niu, 2019). The concept of "Taobao villages" first appeared in 2009 as three cases. Soon, as rural entrepreneurs, mostly farmers, leveraged digital technology to sell their products online, Taobao villages quickly diffused across the country. Taobao villages exploited economies of agglomeration, and sellers from Taobao villages become more competitive on e-commerce platforms (Qi et al., 2019).

The related phenomenon of Taobao towns subsequently emerged as townships or streets that consists of at least three such Taobao villages. A larger agglomeration of Taobao towns form Taobao village clusters[27] (淘宝村集群) when there exists:

- a cluster of more than 10 neighboring Taobao villages that develop together
- where e-commerce entrepreneurs, service providers, the regional government and industry associations work closely together, and
- whose annual e-commerce transaction volume reaches or exceeds RMB100 million.

The number of Taobao villages, each having online shopping transactions exceeding 10 million yuan rose from 20 in 2013 to 3.202 in 2018 (LUO, 2018) reaching large numbers in 2020 with 5.425 villages, 2.96 million online stores that created over 8.28 million jobs and a transaction volume of 1 trillion RMB (AliResearch, 2021). Annual sales from online stores in Taobao villages and Taobao Towns accounted for almost 50%

[27] Retrieved from Alizila- https://www.alizila.com/an-introduction-to-taobao-villages/ in 15/3/2022

of China's rural online retail sales[28]. China's "One Village One Product", ongoing since 2007, laid the foundations of specialization, encouraging every village to develop locally distinguishable products (Liu et al., 2020).

5.3 AN EMPIRICAL ILLUSTRATION OF THE EMERGENCE OF AN EE

5.3.1 Taobao Villages the Emergence of an Ecosystem

Taobao villages provide us with the context to empirically illustrate the role of affordances generated by digital technologies, leading to the birth of an EE, and from this build a conceptual model of the emergence of an ecosystem. The theoretical lens of affordances provides a way to capture and examine the actions of entrepreneurs as they create new ventures from the opportunities enabled by digital artifacts. Our research efforts were developed in two directions. The first was a review of the extant literature on EE emergence from digital platforms, from which the Taobao illustrative example arises. The second was directed towards collecting information on Taobao villages. Although the pandemic crisis precluded our plans of one of the authors visiting Taobao villages, a local research assistant explored multiple data sources in Chinese language that provided crucial and more comprehensive information. and multiple data sources from China. Our empirical reflection emerges from the interaction between the in-depth analysis of the different sources of information, namely case stories, the Chinese media. Gibson's affordances provide us with a theoretical lens to understand the emergence of

[28] https://news.cgtn.com/news/2021-03-06/E-Commerce-helps-fight-poverty-in-China-YpsDMjZgJi/index.html

the Taobao village ecosystem (Taobao means “digging for treasure” in Chinese), fruit of a mechanism where agents, artefacts, and affordances interact. The use of the theoretical lens of affordance provides twofold advantage on our understanding of the Taobao phenomenon. First it allows us to disentangle the interaction between e-marketplaces and the entrepreneur in the TV. Thus providing the “missing” link between the individual entrepreneur action and agency and what happens at the ecosystem level (Nambisan et al., 2019; Nambisan & Baron, 2021). Second, it provides a way to understand entrepreneurial enaction and the emergence of an ecosystem based on the use of affordances enabled by digital technology. In what follows we present our main empirical reflections interlacing affordance theory with both individual and collective action in which material and social agency are two important components of the same phenomenon (Leonardi, 2013).

We begin by describing the technology artefacts that provide the foundations for the development of the affordances, followed by a comprehensive description of the different types of affordances. We also describe another type of agents that emerge from the development process labeled the complementors. EE and finally describe the role of institutional support.

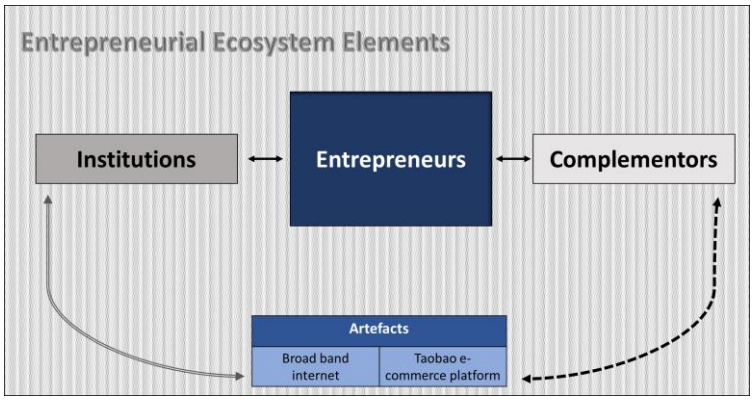

Figure 5-1 - Entrepreneurial Ecosystem Elements - Taobao village

5.3.2 Technology Artefacts

An artefact refers to an object, tangible, or intangible, made or given shape by agency, human or non-human, presenting action possibilities (Burlamaqui & Dong, 2015). Artefacts enable the "social and material come together" (Lawson, 2008, p. 56). Therefore, affordances are elicited from the properties of an artefact and its interaction with the agent and context. In the case of Taobao villages we found two important and interconnected artefacts, high speed internet and the Taobao e-commerce platform. These artifacts yield the action possibilities of affordances, in turn promoting and shaping the Taobao village phenomenon.

5.3.2.1 High speed internet in the villages[29]

The Chinese government launched its "Broadband China" strategy in 2013, to expand the internet coverage in all urban and rural areas of China by 2020. As of October 2019, more than 98 percent of China's administrative villages had been connected with fiber-optic and 4G networks, and 99 percent of poorer villages had been linked with broadband

[29] From here on, for the sake of parsimony, the term "Taobao" will refer to Taobao villages and when referring to the e-commerce platform we will use the expression "Taobao platform"

internet services[30]. High speed internet implies rapid access to online platforms, greatly facilitating e-commerce in rural areas (Leong et al., 2016), and boosting the sales of agricultural and food products. The internet's diffusion in rural China has also provided access to other resources such as gaining access to education via online platforms and enabled the provision of quality medical resources with the help of Artificial Intelligence. Technologies are artefacts which may both be "shaped by and shaping of the practices humans use in interaction with, around and through them" (Hutchby, 2001, p. 444). For an EE, digital artifacts play this twofold role of supporting an accelerated growth of the enterprises and the ecosystem, but also as one element that is conducive of the individual entrepreneurs' actions in shaping the development process of the ecosystem (Zahra et al., 2022).

5.3.2.2 The Taobao e-commerce platform

E-commerce platforms are technologies capable of supporting high volumes of online transactions (Albrecht et al., 2007) that can serve as an active ingredient fueling innovative initiatives (Nambisan, 2017). Technological objects enable different sets of human actions to take place, with artefacts forming a technical sub-system which supports processes that are not necessarily process-limited (Pries-Heje et al., 2008). Platforms enable action but are at the same time shaped by its users into an "evolving artifact" (Leong et al., 2016, p. 483), and enabled through the recombination of elements into what Autio et al. (2018) labelled 'generativity'. Powered by highspeed Internet, China has witnessed a boom in e-commerce, in which the Taobao platform assumes a lead role. Ensuing the 2009 crisis, the government promoted domestic market to compensate the

[30] Retrieved from: http://www.chinadaily.com.cn/a/201908/02/WS5d43f3c6a310cf3e355639b3.html in 2022/02/03

decrease in exports, this shift allowed the Taobao platform to grow of and attain a leading position (Kwak et al., 2019). The Taobao platform is one of three retail e-commerce sites founded by the Chinese e-commerce giant, the *Alibaba Group*. By 2012 the company understood the e-business expansion had created an ideal momentum to gain an advantage by transforming its business (Jing & Van De Ven, 2018). This allowed the company's accelerated growth and a path to transform it into the world's most valuable retailer (Song, 2019). The Taobao platform also demonstrates what can be achieved by a latecomer in an emerging economy (Mehrotra & Velamuri, 2021; Wu et al., 2010).

5.3.3 Tao Bao Affordances

For purposes of expositional ease, Taobao affordances are organized into two categories according to those that enable individual agency and those that also promote community/social agency. In turn, individual agency affordances encompass three types: *generic*, *functional,* and *contextual* affordances, while community or social level agency affordances include *generative* and s*patial types*.

Individual Level Affordances		
Generic	Functional	Contextual
Accessibility Desintermediation Visibility	Metavoicing Flexibility	Motivational Variability

Community Level Affordances	
Generativity	Spatial

Table 5-1 - - Types of affordances in Taobao village

5.3.3.1 Individual agency affordances

5.3.3.1.1 Generic affordances

Generic affordances are enabled across online marketplace platforms representing potential for action that apply broadly to a variety of artefacts and different types of agents resulting in recognizable and concrete outcomes (Volkoff & Strong, 2013). Our analysis revealed that there are three generic affordances at play, which were particularly relevant to the context of the emergence of Taobao villages. These were *accessibility*, *disintermediation,* and *visibility*.

Accessibility Digital platforms' potential easy access to information and resources, creates an accessibility affordance whereby user communities and knowledge networks can tap into vast amounts of information via portals, websites, and gateways (Conole & Dyke, 2004). The twin artefacts of high-speed networks, and the Taobao platform e-marketplace, enabled villagers to suddenly have access not only to 'what's going on out there' but also to 'what's out there?' and 'what can I do with it?'. It should be borne in mind that many villages in China were quite isolated with poor material communication links. Hence digital affordances were a major game changer compared to nations whose rural economy and society is better integrated by material communication networks. With entrepreneurial activity becoming less bounded by spatial and temporal limits in the affordances provided by digital technology (Nambisan, 2017). Enabling entrepreneurs to reach across their regional scope to access resources and markets previously inaccessible (Autio et al., 2018; Zahra et al., 2022).

Disintermediation is a long-recognized affordance of the internet (e.g., Bakos, 1998; Gellman, 1996; Jallat & Capek, 2001). It informs the ability of an e-commerce platform to enable direct connections and interactions between service providers and end-users, thus bypassing intermediaries. As search costs fall, traditional intermediaries have little or no role to play. The Internet driven e-marketplace platforms reduce the power of middlemen in value chains, reducing dependency on location-specific value chain assets and resources, opening new opportunities for value-creating interactions with end users (Autio et al., 2018; Leong et al., 2016). The reconfiguration of rural China benefitted particularly from the disintermediation affordance of Taobao platform. One eloquent example of the impact of disintermediation is provided by fruit vendors. Previously, they sold their products very cheap to wholesalers, who in turn resold it in urban areas for a much higher price (up to ten times higher). Presently farmers can sell their products directly to consumers through the Taobao platform, substantially increasing their profit. Furthermore, making use of live broadcast on Taobao platform (and also Kuaishou and Douyin platforms) farmers can now reach Chinese consumers across the country, multiplying the number of potential clients and publicizing the benefits of their products. Similar stories abound about the Taobao phenomenon, with the disintermediation affordance of the platform spurring entrepreneurial activity among villagers.

Visibility affordance alludes to whether and what information exists and the relative ease with which it can be encountered (Treem & Leonardi, 2012). Visibility affordance encompasses the level of difficulty associated with finding a piece of information (Evans et al., 2017, p. 40), reflecting the "relational link among the object, user, and outcome". Visibility affordance is connected to searchability, of special relevance to Internet and e-commerce platforms. The capacity to maximize visibility to potential customers with

minimum investment is crucial for success in resource scarce environments (Mehrotra & Velamuri, 2021). For entrepreneurs the visibility affordance is crucial. Increasing the visibility of a product/service to buyers, mitigates the effects of existing information asymmetries. This lowered the risk level, since visible perception reduces uncertainty about the product or service as well as improving awareness by making related product pictures and information available (Dong & Wang, 2018). The appearance of the Taobao platform in rural China enabled visibility affordance, opening up possibilities for entrepreneurs living far from major urban cities. This opened both national and international markets for traditional products, traditional handicrafts, and artisans e.g., peony painting, Tang tricolor ceramics (Luo & Niu, 2019). The increase in sales and income from the revitalization of markets of these traditional products encouraged many people to return to their villages (Luo & Niu, 2019).

5.3.3.1.2 Functional Affordances

Besides the more generic affordances e-marketplaces, there were also particular functional affordances in play. Functional affordances have been defined as a design feature that is a system function, that helps user accomplish their work (Hartson, 2003, p. 323). We found three functional affordances crucial in promoting rural digital entrepreneurship by the Taobao platform: *metavoicing* and *flexibility*.

Metavoicing affordance enables platform agents to interact online, by engaging in conversations, reacting online to users' presence, profiles, content, and activities (Majchrzak & Markus, 2013). It enables buyers and sellers to rate each other (or just the seller in the case of Taobao) and provide feedback on products during interactions, creating reputation (Kietzmann et al., 2011). In e-marketplaces, metavoicing is the

engagement between merchants or entrepreneurs with potential or actual customers, through informal two-way interactive channels. Metavoicing affordance enhances the level of buyer-seller interactivity, "aggregating individual voice and feedback into an interactive conversation" (Dong & Wang, 2018, p. 53). On the Taobao platform, customers could seek and receive product related information, help solve transaction related problems that might occur, and conduct product rating. Online transactions inherently involve an element of trust, and Taobao platform engages in attempts to mitigate mistrust on the part of buyers towards the sellers or their products (Kwak et al., 2019). As well as not charging for listing or transaction fees, Taobao platform also set up an instant-messaging service called Wangwang, widely used between buyers and sellers to discuss deal related information (Wu et al., 2010). In contrast to China eBay which had previously been operating in China, that not only charged users a listing fee (Yu & Cui, 2019) but also did not allow direct interactions between buyers and sellers until the sale was completed. Thus, as part of the trust building effort, Taobao's platform permitted direct contact and interaction between the buyer and seller (Kwak et al., 2019). Taobao platform also benefited from Alibaba's increasing legitimacy that derived from a strategy founded in by becoming more visible than its competitors and ensuring a collaboration with the government, the latter and despite the opposition of banks allowed the introduction of its pay system that included a high degree of consumer protection that reinforce its legitimacy (Kwak et al., 2019).

Taobao's supporting instant communication software, *AliTrademanager*, greatly facilitates the communication between buyers and sellers. *AliTrademanager* is a new brand that integrates the original *Taobao Trademanager* and *Alibaba Tradelink*. It is a free online business communication software tailored by *Taobao* and *Alibaba* for the merchants. *AliTrademanager* has many special functions, for example, the suppliers can

contact customers at any time, where each message is marked with the user's online status, to facilitate business related conversations. It enables up to 30 people online at the same time in the business negotiation room; it provides some free business services such as subscription to business opportunities, industry information, the weather and securities conditions, online translation, business travel assistant and so on.

Metavoicing is also empowered via *Taobao Live*, enabling customers to pose questions related to products or processes, directly to the sellers through live chat rooms, or pursue follow-up questions (Sun et al., 2019). The possibility of reaching costumers through live broadcasting enabled new ventures and was crucial for the success of many entrepreneurs. There was an intense adoption of this technology among Taobao entrepreneurs; in February 2020, for example, the number of merchants broadcasting utilizing *Taobao Live*, "exploded" by 719% from a month earlier (AliResearch, 2021). It contributed to $7.5 billion total transactions in the first 30 minutes of the year's "Single's Day" event (Arora et al, 2021).

Flexibility: The Taobao platform provided a flexibility affordance, by which, the ways that buyers and sellers could interact is flexible. Taobao's business model was flexible, changing its primary business model from a C2C to a B2C in 2008(Kwak et al., 2019; Yu & Cui, 2019). Flexibility affordance implied constantly changing and enlarging action possibilities of both buyers and sellers. A Taobao platform buyer could become a seller and vice versa, blurring the boundaries between the B2B and C2C business model. The Taobao platform shopping environment now includes in addition to product display, videos, livestreaming, virtual reality, games and competitions, communities, and even key opinion leaders (KOLs) (Hanlon & Tuten, 2022). It is evolving as much into an entertainment environment as it is for shopping (Wang et al., 2017).

5.3.3.1.3 Contextual affordances

Our analysis further revealed a third affordance promoting entrepreneurial agency, which for the sake of consistency, we categorize as *contextual*. While the above related affordances enabled entrepreneurship, they were also available to other, more urban parts of China. Contextual affordances, unlike the previous ones, result from the specific rural context of Taobao villages. Entrepreneurship is frequently a matter of context (Baker & Welter, 2020) and thus these are crucial to EE development and to our understanding of the ecosystem that emerged in Taobao villages.

Variability: The affordances yielded by the technology artefacts (high speed accessible broadband and Taobao), offered opportunities for action that others similarly located might imitate to create their own ventures, expanding the culture of entrepreneurship on Taobao villages, away from traditional rural activities. Bundles of similar affordance strands, interact, providing enabling conditions that are neither a property of the artefacts as actants or the agents as actors, but are a property of their relationship in an actor network. Villagers observed neighbors becoming entrepreneurs and working from home on the Taobao platform; some would be enviously resentful while others will be institutionally mimetic creating a cascading knowledge diffusion of novel practices, giving rise to interest from other villagers who also want to learn more about how they too could sell their products through e-commerce (Leong et al., 2016). Proximity in rural settings leads to greater transparency, which coupled with the perceptible improvement in the livelihood of the neighbors engaged in e-commerce, generates a new set of mimetic affordances (Wu et al., 2020). Individual success led to a collective realization of the action possibilities and a greater knowledge of and confidence

in the potential of e-commerce. In each village, there were one or two individual 'pioneering' entrepreneurs who initiated new activities, thus acting upon the generic, functional and contextual affordances, and in so doing opened entrepreneurial possibilities for others in the village. Low entry barriers in China's rural villages, often regarded as 'societies of acquaintances' in which information is relatively public (Xi Chen et al., 2014) mean that once an individual starts operating a Taobao store online in a village that does well, this successful experience will be mimicked by relatives and neighbors very quickly. This type of social learning (Fiebich, 2014) is fundamental for the development of affordances and played a crucial role in the expansion of Taobao development model. The successes of some will then attract more people to enter online business. Several examples are described in extant literature e.g., *Suichang, Jinyun* (Leong et al., 2016) *and* Junpu (Qi et al., 2019). Some of these villages eventually become rural e-commerce clusters.

Motivational affordances are contextual affordances, that create opportunity for entrepreneurs in terms of the availability of agents and artefacts being perceived as occasions for actions that innovate beyond agents' existing repertoire of practices (Weiser et al., 2015). Different contexts can proffer different affordances shaping the way actors and actants may be perceived situationally. The concept of situated affordances has been defined as "opportunities to satisfy motivational needs provided by the relation between the features of an artifact and the abilities of a subject in a given situation, comprising of the situation itself (situational affordances) and the artifact in its situation-specific meaning" (Deterding, 2011, p. 3). While useful as far as it goes, this definition does not go far enough. It remains subject-specific, and too individualist. Where and when affordances are perceived and shaped by practice, they can be thought of in a future

perfect frame: using affordances as a basis for 'idea work' (Coldevin et al., 2019) a desired future situation can be imagined as if already achieved, providing a project to achieve and a purpose to carry on (Pitsis et al., 2003; Schutz, 1967). The agency is rarely that of a single player, a 'heroic entrepreneur', or a lone ranger. Instead, it is far more likely to be something emergent and assembled from detailed discursive intertextuality (Coldevin et al., 2019). A set of artifacts may pose various opportunities for the same agents in different contexts or for different agents in the same context (Dostert & Müller, 2020); hence the importance of the discursive intertextuality of the idea that these artefacts might prompt in making sense of the situation. The extent to which the perception of entrepreneurs and the development of businesses in rural areas is conditioned by factors such as distance, lower density of networks and national context, is unclear and is still a subject of debate (Lee & Cowling, 2015). Taobao Villages is a proof of digital technologies' capacity to override the expected incapacity to develop a flourishing EE and contracting material determinism. The artefacts of high-speed Internet and the Taobao e-commerce platform afforded rural inhabitants "opportunities for the experience of autonomy, competence, and relatedness" (Szalma, 2014, p. 1461) where they were able to master the affordances, construct the actor networks and frame their products. The low incomes of the rural sector and the limited opportunities that the lack of a residential permit afforded to move to special economic zone, or a major city meant that the Taobao provided rural Chinese with venture opportunities on the platform.

5.3.3.2 Community Level Affordances

Digital technologies influence social agency, and mold entrepreneurship and therefore influence the development of EEs (Nambisan, 2017). Digital technologies provide ways to develop and strength networks of, and between EE actors, they also

provide a means to organize collective action processes that result in entrepreneurial activity (Zahra et al., 2022). Affordances arising from artefacts can emerge from relationships between "aggregated technologies and larger social collectives" (Robey et al., 2013, p. 391). Affordances can therefore be nested and as McGrenere and Ho (2000) state, 'it is important to note that affordances exist (or are nested) in a hierarchy and that the levels of the hierarchy may or may not map to system functions' (p.185). There is thus a nested nature to affordances, whereby an action on affordances can lead to new affordances.

Digitalization supports key affordances that shape the locus of entrepreneurial opportunities and can lead to the creation of clusters (Autio et al., 2017). We find two other level affordances- *generativity* and *spatial* whose dynamic interaction had a cluster effect.

5.3.3.2.1 Generativity

Generativity is the "capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences" (Zittrain, 2008, p. 70), and has been considered as a fundamental characteristic of an ecosystem (Autio et al., 2018; Henfridsson & Bygstad, 2013; Leong et al., 2016). Technology can drive generativity affordances by enabling an invisible coordination of geographically dispersed audiences opening new ways to build and harness platform momentum (Autio et al., 2018; Nambisan, 2017; Thomas et al., 2014; Zittrain, 2008). In rural China, the twin artefacts of broadband and e-commerce platform provided a generative affordance, creating the possibility for the emergence of a village ecosystem. Building upon these artefacts, rural entrepreneurs fueled generativity with the establishment of their own ventures on the Taobao platform. The generative capacity of e-commerce platforms, led to a diffusion

and creation of a new rural entrepreneurs, village by village, and eventually the Taobao ecosystem. Exponential venture creation in rural China with high-speed internet and the Taobao platform enabled participation generativity, the outcome of which was innovation (Zittrain, 2008) that reduced transaction costs, infusing scale and scope, transforming Taobao.com into a dynamic and fluid e-commerce market. Online markets potentially connect buyers with sellers anytime and anywhere, providing quick access to information and resources (Ellison et al., 2014; Fox & McEwan, 2017; Wellman et al., 2003). Taobao also extended to the creation of an ecosystem of services that buyers and sellers could access, enhancing the range of their action possibilities as well as promoting trust. These "inbuilt trust mechanisms" provided by the internet and digital platforms may offer a substitute for in person and social trust mechanisms that is not bounded by geographical proximity (Autio et al., 2018, p. 76).

Soon after Taobao's platform inception, an online payment system called *Alipay* was introduced, to facilitate financial transaction. Being "attuned to the Chinese way of transacting" (Tan et al., 2016), *Alipay* quickly emerged as *Taobao*'s favorite transactional mode by 2004 (Kwak et al., 2019). Gradually, *Alibaba, Taobao*'s parent company, created an "ecosystem" of services for its buyers and sellers alike, that afforded a wide range of accessibility options, well beyond connecting buyers to users (Kwak et al., 2019; Wu et al., 2020). Besides *Alipay*, it developed its own logistics system (while still maintaining connections to other logistical businesses); *TrustPass* an evaluation system on *Taobao; China Yahoo!* for search; *Alisoftware* for tools as well as a third-party payment instrument- *Zhifubao* to ensure the internet payment security. It also created *Taobao Partners (TPs)*[31] that provide a range of services, including managing daily

[31] https://www.taobao.com/markets/promotion/tmgtp5

merchandising, logistics and promotional marketing for different platforms (Yu & Cui, 2019).

5.3.3.2.2 Spatial affordance

There is a spatial dimension to the innovation process, with physical proximity between agents playing a crucial role in supporting shared learning, knowledge exchange and tie formation, all of which enhance the formation of localized clusters. Spatial affordances enable more interactive agent behavior, with positive effects on productivity and innovation. The EE literature emphasizes the importance of the facilitating role of spatial mechanisms, supporting external economies of scale and scope, with productivity-enhancing pecuniary and non-pecuniary externalities "that enhance the productivity and innovative output of agglomeration participants." (Autio et al., 2018, p. 77). The merchants and manufacturing businesses in Taobao villages compete heavily against each other, but they also share production capacity and work together as subcontractors. Many clusters of small businesses in China have worked together for years, but today this type of informal cooperation is facilitated by a cloud-based service platform provided by Alibaba (Leong et al., 2016). Growth of the principal businesses may also spark the formation of ancillary businesses in local communities, such as product photographers, graphic designers, logistics providers, and packaging specialists.

5.3.3.3 Creation of complementors

Affordances also encourage the creation of other agents, mostly related to the e-supply chain. While villagers turn entrepreneurs producing or distributing via Taobao platform, different needs arise to ship these products to customers downstream or to fulfil upstream supply chain needs. *TPs* provides a range of services to entrepreneurs, including

managing daily merchandising, logistics and promotional marketing of different platforms. The more "internet-literate, entrepreneurial and ambitious young people have also been recruited as rural *TP* to run village-based Taobao service stations" (Yu & Cui, 2019, p. 3). TPs were complementors who promoted accessibility affordances, where an ecosystem of complementors "produce innovations that increase the success of the platform" (Eckhardt et al., 2018, p. 370).

The TP complementors who play an important role in the Taobao ecosystem, producing complementary products and services (Yu & Cui, 2019). Logistics were also an alternative for entrepreneurs to establish new ventures and the presence of these complementors even serving as a stimulus for new Taobao enterprises (Leong et al., 2016). The need for services has been evolving, more recently with live streaming. Besides logistics and delivery, as more villagers gained experience in e-commerce on Taobao, various needs arose for services such as apps for smartphone, photography, graphic design, packaging, and other support services.

5.3.3.4 Institutional support

While the Taobao platform serves as the e-market on which sellers can make their products available online to buyers anywhere, there remain needs for production facilities, infrastructure for access to transportation for shipment of products, and other ancillary services. Offline infrastructure is vital for online e-market success and in rural China, it was important to improve the quality of infrastructure, such as road transport, railways, and telecommunications.

It is not just the perceived or actual affordances which are relevant but also the agents' capabilities to enact upon them. To utilize a feature, "subjects must not only know that the feature is available but must also be capable of deploying the feature" (J. L. Davis &

Chouinard, 2016, p. 245). Competences are required, for instance to type on a keyboard or click on a mouse physically, as well as how such actions play out. Residents in the poorer rural areas tend to lack not only entrepreneurial skills, but also technical ones, for instance how to use the computer. Thus, affordances need to be moderated by a wide variety of support, which involves computer training, skill development and the like.

We find strong evidence that several stakeholders provided key support not only to improve infrastructure, but also in capability enhancement of the interested rural entrepreneurs. The government and its agencies "did not try to lead the development policy or direction and focus on building infrastructures such as roads, electricity, and telecommunication" (Expert communication [32]). Also, the government assumed responsibility for solving problem arise from the community such as securing land usage for the factory, for instance changing land use from agriculture to industrial application, a change that is extremely difficult to make in rural China (Expert communication). Different stakeholders committed themselves to adapt broader institutional structures that would support the emerging Taobao ecosystem. We found instances of institutional support that included:

- Local authorities and the Taobao platform improved roads, broadband internet services, power supply and logistics to support residents in setting up online stores (Leong et al., 2016). Favorable government programs have provided training (Luo & Niu, 2019), infrastructure, public services, and a business-friendly atmosphere that is crucial for success (Leong et al., 2016).
- More evidence of institutional support was provided by Suichang Municipal Government that set up MyStore, a shopfront of about 1,000 local agricultural

[32] Shaji Studio - https://www.studioshaji.org/

products offering supply-chain services, at a low rental cost who organized workshops, competitions, and forums in order to encourage the villagers to participate in e-commerce (Leong et al., 2016).

- Local associations offered villagers support in the form of free e-commerce training, including pricing, photo shooting and editing, and marketing strategies (Luo & Niu, 2019; Qi et al., 2019).

5.4 DISCUSSION

Our research was prompted by the desire to understand how digital technology impacts the development of EEs, particularly how the effects that have an impact across levels of the ecosystem shape entrepreneurial activity and process. We underline the relevance of providing an empirical illustration, in our study as our backdrop we used the less studied contexts of emerging economies and rural areas for. Thus, answering to calls to develop this area of EE research and providing empirical evidence (Leick et al., 2022; Nambisan et al., 2019).

Affordance theory provide us with a tool for studying these issues that represent significant gaps in EE literature. The interaction between agents, artefacts, and affordances reveals the mechanism underling the Taobao ecosystem emergence. Examining isolated elements of the EE has been pointed as a weakness in EE research (Stam & van de Ven, 2021; Xie et al., 2021) as well as its fragmentation (Candeias & Sarkar, 2022; Stam, 2015). It has been argued that connecting the individual, venture and ecosystem levels through a unified theory is a positive step towards a less fragmented research area (Roundy et al., 2018). Our paper follows this line of thought, and resorts to

the affordance theory as a theoretical lens to examine the connecting mechanism between opportunity identification and the impact of digital technologies at the ecosystem level. Therefore, the concept of affordance provides a link between actors, digital artifacts and the outcomes of their interconnection for the ecosystem enabling a more comprehensive perspective of the mechanisms of value creation and capture in the EEs (Nambisan, 2018). This is also essential to counterbalance the individual or organizational perspective adopted in studies addressing the effect of digital technology overlooking the ecosystem level (Elia et al., 2020; Li et al., 2017).

Emerging economies play a crucial role in global economy, and the development of EEs is part of their development strategy. Hence, EE research must include these ecosystems, notwithstanding the challenges arising from their heterogeneous contexts and issues (Kantis et al., 2020). Furthermore, it is unclear to what extent factors such as distance, lower density of networks and national context, influence entrepreneurship in rural areas (Lee & Cowling, 2015). Hence, the development of an EE in a rural context may, in certain cases, diverge from the "urban-centric" systemic models offered by extant literature (Miles & Morrison, 2020, p. 935). Underlining the importance of extending research to different contexts, that can provide valuable insights for advancing theory. This is why, understanding the EE phenomenon in emerging economies is critical from both academic and policy perspectives (Cao & Shi, 2021).

By using the Taobao villages as an illustrative example, we were able to examine a prosperous EE that evolved within a rural area of an emergent economy. The development of the region is founded in two digital artifacts, broadband internet and the Taobao platform (Figure 1). The importance of internet in the development of EEs has been observed in European countries (Audretsch & Belitski, 2017; Wurth et al., 2021). However, by observing its impact on Taobao villages it is possible to provide a broader

perspective on the increased importance of digital technology in scarce resource, rural areas. Our analysis confirms Nambisan's (2017) claim, that the interconnection of digital artifacts and contextual characteristics, provides a leeway to obtain valuable insights on the capacity of digital technology and entrepreneurship to generate new entrepreneurial opportunities and create value for ventures and EEs. This mitigates the effects of distance, lower density of networks and access to markets (Autio et al., 2018).

Furthermore, the development of this ecosystem was triggered, and later-on supported by, a latecomer use of digital technology that was already common in developed countries (Wu et al., 2010). The impact of the Taobao platform illustrates how a technology common in developed economies can have a disruptive effect in an emergent economy (Mehrotra & Velamuri, 2021; Wu et al., 2010). This effect is epitomized by Jack Ma´s statement "Ebay may be a shark in the ocean, but I am a crocodile in the Yangtze River. If we fight in the ocean, we lose—but if we fight in the river, we win."[33] China's digital transformation has even outpaced developed economies, its e-commerce transactions value exceeds France, Germany, Japan, the United Kingdom, and the United States combined (LUO, 2018) reaching 42 percent of global e-commerce (Wang et al., 2017).

However, digital technology alone is not sufficient. In EEs, digital technologies are a source of entrepreneurial activity but demand a continuous exploit of new possibilities for its use (Zahra et al., 2022). And this depends on entrepreneurs and other EE actors' perception and agency. An affordance results from the intersection between possibilities inherent to the artifact and agency, whether individual or social (Gaver, 1991; Robey et al., 2013). Therefore, we hold that the affordance theoretical lens provides an adequate tool to examine this process in EEs and support our claim on recent insights regarding the

[33] As cited in (Wu et al., 2010)

impact of digital technology in coworking spaces, venture accelerators and makerspaces (Autio et al., 2018; Nambisan, 2017).

Digital technologies influence social agency and mold entrepreneurship and therefore influence the development of EEs (Nambisan, 2017). Taobao villages build on the impulse provided by digital artefacts and agentic action of entrepreneurs translated into affordances. Our research uncovers affordances of two main categories, individual agency affordances and community level affordances. This adds an enhanced level of analysis focusing on the type of agency, going beyond the digital vs spatial dichotomy. Thus, we extend research to a more holistic perspective on the influence of digital technology, by identifying multiple affordances and the emergence of another type of EE actors, the complementors as well as the digital artifacts. Table1 represents a summary of the affordances identified in Taobao villages.

Three types of individual agency affordances were identified. The first, generic affordances represent the potential for individual action provided by the artefacts and entrepreneurs that generate outcomes (Volkoff & Strong, 2013). The second addresses the affordances provided by the use of functionalities that exist in the artifacts (Majchrzak & Markus, 2013), that is to say internet and the platform. Finally contextual affordances develop from the specific context of the EE. Establishing a parallel to Autios' (2018) classification, the generic and functional are digital type affordances while contextual are essentially spatial type affordances since they emerge from the specific context of Taobao villages.

As for community level affordances which enable clusters to emerge within the EE, these are organized into two types. The first is generativity affordances, digital technology and in particular internet enables coordination of geographically dispersed audiences, allowing innovation, emergence accessible and adaptive solutions leveraging input

productivity (Autio, 2018; Nambissan 2017). The second encompasses community level spatial affordances i.e., those that result from the effects of mechanisms that result from spatially bounded characteristics and factors (Autio et al, 2018).

An affordance is an output of the interaction between artifacts and agency. Digital technology and artifacts enable the emergence of affordances that positively impact entrepreneurial activity (Autio et al., 2018; Nambisan, 2017). Thus, the affordance concept adjusts to what Stam (2015, p. 1766) described as "intra-layer causal relations" between the elements of the EE and entrepreneurial activity, deemed the intermediate output of the ecosystem. Stam (2015) underlines the importance of the connection between the four different layers (systemic and framework conditions, outputs, and outcomes). These intra-layer causal relations, that run upwards and downwards, are fundamental for understanding the EE and the prevalence of entrepreneurship in a region (Stam, 2015) and are an issue capturing growing interest in EE literature (Wurth, 2021). Using an updated version of the model, Stam´s reasoning was later developed in Wurth et.al (2021, p.9), by describing how these interconnections that result from complementary between EE actors, resources and information that generate "untraded interdependencies" witch in turn constitute "a collective asset of groups of actors within an economy". In the complementarity of actors, resources and the information needed to use them resides the bulk of the affordance concept (Gaver, 1991; McGrenere & Ho, 2000). Furthermore, the capacity of digital technologies to generate a shared value (Nambisan, 2017) is also mirrored in the development of the collective assets. Hence this recent characterization of the EE is even more aligned with the affordance perspective and the impact of digital technology in EEs.

Taobao villages emerged from affordances, made possible by the interaction of systemic (networks of entrepreneurs, support systems) and framework (institutions,

physical conditions) conditions. Taking stock from Stam's EE framework (Stam, 2014, 2015, 2018; Wurth et al., 2021), we represent Taobao villages as and "output" of the EE materialized from the affordances, represented as the intermediary between the ecosystem and its outputs (Figure 2). However, Taobao villages also influenced the ecosystem layers e.g., by the development of complementors and by attracting new entrepreneurs and resources to the ecosystem. This also fits well with the bidirectional causation identified by Stam (2015).

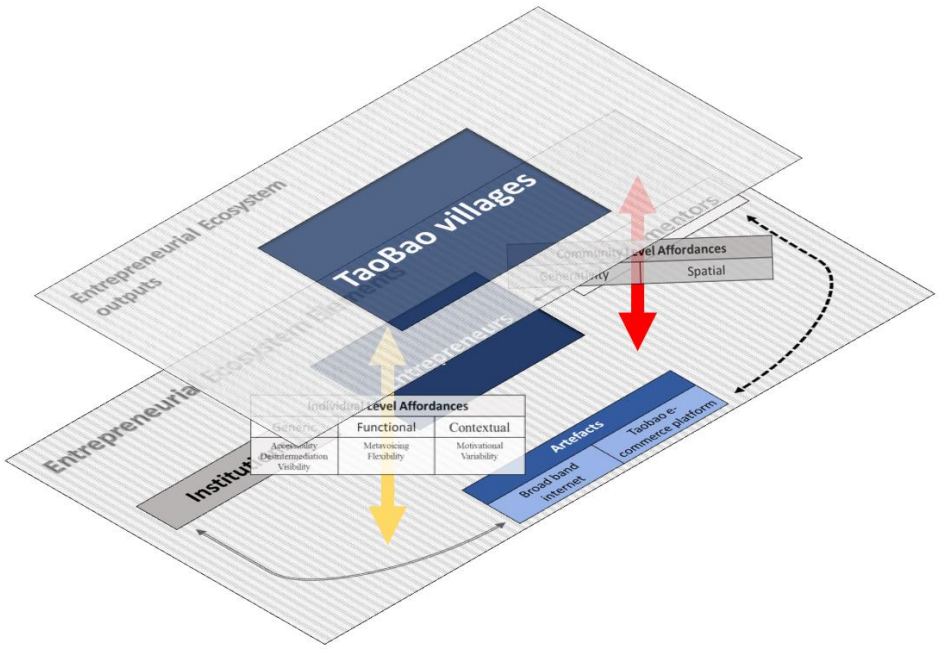

Figure 5-2 - The Taobao entrepreneurial ecosystem

Adapted from Stam (2015) and Wurth et al (2021)

Summing up, the introduction of digital artefacts enabled the development of a thriving EE. From the surge of entrepreneurial activity emerged the Taobao villages, as an output of the ecosystem. Affordances emerged from the interconnection of several EE elements; artefacts, entrepreneurs, institutions, providing a mechanism that links, the elements of the ecosystem and entrepreneurial activity. Thus, our research by extends the use of the affordance concept to the domain of EE literature, providing valuable insights onto the causation and questions regarding this connection that are a rising issue

in EE literature (Wurth, 2021). Moreover, by integrating our empirical evidence in a well known the framework of EE, we were able to add credence to our research while extending the application of the framework to a rural region of emerging economy.

5.5 CONCLUSIONS

Entrepreneurial activity becomes less bounded by spatial and temporal limits as a result of the affordances provided by digital technology (Nambisan, 2017). However, entrepreneurship research has not yet advanced in this area to be able to understand the impact of digital technology on agency, institutions, and the development of EEs (Sussan & Acs, 2017). Digital platforms can be regarded as digital artifacts that work as external enablers for developing new or existing ventures (von Briel et al., 2018). However, the potential afforded by the enabler is not always elicited by entrepreneurs and ventures (Davidsson et al., 2020). This link between individual opportunity identification and external enablers at context level, that is key for understanding digital entrepreneurship, has been scarcely the object of empirical illustration (Leick et al., 2022).

Our theory addresses this important gap, providing a link between the individual entrepreneurs' action and the emergence of an EE (Roundy et al., 2018). By connecting the literature that examine the micro-level and the ecosystem level we provide an important contribution to the development of EE research and uncovering the mechanisms of ecosystems' emergence and development. Furthermore, our research also provides a link between two literatures that have recently been growing in scholarly interest EE and digital entrepreneurship and does so supporting our theoretical argument in an illustrative case. We address the profound impact of digital technologies as a driver for entrepreneurial processes and a fundamental force for molding entrepreneurial activity and outputs and outcomes. We untangle the role of the digital artifacts in the development

of the EE. The affordance perspective allowed us to do so without an excessive focus on digital technology that lost sight of the role interconnections between agents of the EE (Leonardi, 2013; Leonardi & Vaast, 2017). It also allowed the integration of our findings in Stam's (2015) recognized framework of EE.

Making use of affordances as a theoretical lens, provide a theoretical treatment (Autio et al., 2018, p. 73) and a way to contribute for the advance of EE research. We hold the use of the affordance concept provides a useful theoretical lens for the study of EEs since affordances imply a complementarity between actors and environment (Gaver, 1991), thus adequately describing the link between elements of the EE and entrepreneurial activity (Stam,2015). Further, analyzing groups of affordances unveils the mechanisms behind sequential and spatially nested complex actions (Gaver, 1991), adequate for the study of a localized and evolving phenomenon such as EE (Audretsch & Link, 2019).

Finally, we present an illustrative example thus providing empirical evidence that has been called for (Leick et al., 2022). Furthermore, studies have so far largely concentrated in developed economies and successful EEs. However, the study of EEs phenomenon in emerging economies is critical from both the academic and policy perspectives (Cao & Shi, 2021). In our illustrative example of Taobao villages, affordances result from the interaction between entrepreneurs' agentic behavior and (digital technology) artifacts. This interaction occurs as individual as well as at community level. The development of theses remote villages, isolated by topography demonstrate the ground-breaking potential provided by digital affordances and the development of EE in boosting economic growth, regardless of an unfavorable geographic location and difficult communications and consequent development of networks. Hence, they provide a particular context that illustrates how prosperous ecosystems may emerge, in remote rural areas. In this context a type of digital rural

entrepreneurship emerges. Our research contributed to both, mapping a more detailed panorama of the type of affordances that emerged covering and integrating within the EE framework the three “manifestations” of digital technology in entrepreneurship (digital artifacts, digital platforms, and digital infrastructure) (Nambisan, 2017). It has been argued EEs in emerging economies evolve in very heterogeneous contexts that reflect on their characteristics (Kantis et al., 2020). In the same line of thought we hope our research opens new path for further inquiry on these economies and regions. However, study is focused one specific ecosystem further study with a wider scope of EEs, including both types of economies can enhance knowledge (Cao & Shi, 2021) and provide insights. Thus, further empirical validation is needed and represents a promising path for future research. Our theoretical conceptualization built on the affordance perspective can also be of great use for understanding part of the mechanism behind EEs evolution in developed economies, in particular why some EEs emerge in peripheral areas and how to support their development.

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CHAPTER 6

CONCLUSION

6.1 MAIN FINDINGS

The kind of entrepreneurship policy required for the promotion of EEs involves the co-creation of a context for productive entrepreneurship, leading to a flourishing EE (Stam, 2018, p. 5), thus being more complex than other entrepreneurship policies. In the EE context policies have to address different types of entrepreneurial activity and regional contexts (Audretsch & Belitski, 2021).

EEs are dynamic, and there is no 'one size that fits all' solutions (Brown & Mason, 2017). EEPs must continuously adapt to EEs singular characteristics (Isenberg, 2010) and evolution (Mack & Mayer, 2016). The successful development of EEs requires the development of a policy mix coordinated to act on different layers, actors, and stakeholders of the ecosystem, a holistic perspective of EEP (Autio & Levie, 2017). Thus, to ensure the effective development of EEs, new approaches to EEP are required, able to cope with EEs complexity (Feldman & Lowe, 2018) and the uncertainty involved in its development.

We understand EEP as a sub-set of entrepreneurship policies (Autio, 2016; OECD, 2020), implemented with the aim of developing a thriving EE through a holistic approach

(Arshed et al., 2014; Autio & Levie, 2017; OECD, 2020) by creating a favorable context for the expansion of productive entrepreneurship (Stam, 2018).

Recently the introduction of digital technologies is molding entrepreneurial activity that consequently becomes less bounded by spatial and temporal limits (Nambisan, 2017). This is a promising and still scarcely explored feature of EEs (Song, 2019; Sussan & Acs, 2017). However, this is a fundamental issue for the advance of the EE domain, and the development of effective EEP. With digital technology enabled affordances being key to understand the transformation undergoing in entrepreneurial activity within EEs (Nambisan, 2017).

6.2 CONTRIBUTIONS

The EE concept is still under-theorized (Autio et al., 2018), and lacking answers to essential theoretical and empirical issues. The concept has gained increasing traction being enthusiastically embraced by the entrepreneurship policy and practitioner communities (Spigel & Harrison, 2018). To the point of being considered "as much of a policy construct as an academic concept" (Brown & Mawson, 2019, p. 348).

Accordingly, this thesis presents theoretical and practical contributions that are summarized in the two next sections.

6.2.1 Theoretical contributions

In the first paper information from qualitative studies is synthesized, thus contributing towards evidence-based theory development. The typology of practice-oriented ideal-types offers insights towards a clearer perspective of public policy interventions regarding the development of EEs. Furthermore it opens a path to develop and support future empirical testing (Lindgreen et al., 2021). The findings also provide evidence-based

support to the validity of several assertions present in previous studies, giving credence to the duality of the 'natural' versus 'artificial' perspectives of EE development, described in EE literature (Colombo et al., 2019; Stam, 2015). Additionally, it allows the natural versus artificial perspectives for the role of government to be explained and integrated in a single framework, not as conflicting or contradictory but as part of a structured set of policymaking options. Furthermore, from the dimensions of the typology emerged two intermediate types of policy intervention that complement and add to the options, and the array of available choices.

The second paper contributes to the theoretical development of EE literature by comprising in a single framework key option for its formulation. The framework highlights the options between playing the role of the 'builder' or the 'curator' of the ecosystem (Spigel et al., 2020). These are not mutually exclusive but complementary roles. This clarifies options for formulating policies and goes beyond the often-criticized lists of key factors (Alvedalen & Boschma, 2017; Stam, 2015). The lack of theoretical development of the EE domain has left EE research with many questions regarding EEP still unanswered, hampered by myths (Brown et al., 2017) and biases (Nightingale & Coad, 2014). The framework takes cue from the findings of the previous paper and thus extends its findings in favor of advancing the theoretical development of the domain.

In line with the previous the third paper extends the application of the effectuation theory to the process of EEP formulation and implementation. Considering the underdevelopment of EE theory, extending the application of other theories and literatures, that engage similar issues and therefore can provide useful insights is an important path for advancing research and theory development (Cobben et al., 2022), and more specifically innovative conceptualizations for EEPs (Carayannis et al., 2022; Feldman & Lowe, 2018). The originality of this contribution is enhanced by the fact that,

to our knowledge, the use of an effectuation theory perspective has never been explored before in the context of EEP. Furthermore the relevance of the theoretical contribution is emphasized by addressing key issues for the advance of the theoretical development of the EE domain namely, the role of EEPs in its evolution (Cobben et al., 2022; Spigel, 2017; Wurth et al., 2021), and the uncertainty and complexity involved in their use for supporting EEs development (Feldman & Lowe, 2018).

The last paper's theoretical contribution has a wider scope since it addresses the profound impact that digital technology is producing in the entrepreneurial processes, focusing on the effects in EEs (Nambisan, 2017; Song, 2019). This dearth of research regarding the impact of digital technology and digital platforms represents an important gap in literature. The affordance theory has been pointed as one promising way to address such gap (Autio et al., 2018; Nambisan et al., 2019). Affordances provide a theoretical framework that offers a better understanding of the emergence and dynamic evolution of EEs (Spigel, 2017). Furthermore, affordances fit well with EEs in at least three ways: first they describe a similar mechanism to the co-evolution process that characterizes the development of EEs (Scheidgen, 2020); second, examining groups of affordances and the mechanisms behind complex actions that may be sequential and spatially nested (Gaver, 1991); finally they provide a perspective that examines links across levels, so far overlooked by literature (Nambisan et al., 2019; Nambisan & Baron, 2021) that this study integrates using Stam's (2015) model of the EE. Furthermore, the paper incorporates an empirical illustration, the Tao Bao villages, this is an important contribute, not only considering the scarcity of empirical illustrations in the EE domain, but also by studying EEs in a rural region of an emerging economy. EE research is often criticized for the bias in EE studies that include only developed western economies. The aforementioned

contributes, unveils important mechanisms for EE development, and especially in a resource scarce, rural region, thus, being of use for advancing EEP research.

6.2.2 Practical contributions

The four papers included in this thesis address the EE phenomenon from a perspective that has practical policy related value and provides insights for a broad audience that goes beyond academia. Considering policymakers and other EE stakeholders' interest in EEs, these contributes underline the important role for research in providing valuable insights for the formulation of entrepreneurship policies (Zahra & Wright, 2011). This section condenses the contributions that have practical implications for policymakers, practitioners and a wide range of EE stakeholders.

The first paper addresses the characteristics of effective EEPs thus providing practical and evidence-based advice for practitioners and policymakers, by taking stock from extant literature to identify relevant evidence for EE practice (Frese et al., 2014; Jaakkola, 2020). The mix of policies must consider the specific characteristics of the ecosystem, and also the stage of the EE's evolutionary cycle, adjusting the policy framework and system focus. For practitioners, insight on the way policy interventions affect EE development are vital but still scarce in EE literature. This paper provides evidence-based insights and a typology that condenses into four ideal-types the options for public policy interventions, according to the dominant type of policy focus and level of intervention, we provide a basis for decision-making, founded on evidence from published studies. Typologies are a valuable instrument for practitioners (Delbridge, 2013), providing a language to explain the hazy nature of a subject, by translating it into a coherent set of types (Cornelissen, 2017).

The second paper takes these insights one step forward. Bearing in mind that, development of EEs requires a complex and variate mix approaches (Bramwell et al., 2019; Harrington, 2017), it provides guidance regarding key parameters to inform the formulation of EEPs, to advance research and assist policymaking. Each EE has unique characteristics and evolution trajectory. In this context the value of generic insights is limited. Thus, instead of a predetermined route we provide a 'map', covering different options for the formulation of EEP, comprised in a single conceptual framework.

Following the same line of thought, the third paper addresses the process of formulation and implementation of EEPs. Despite being more focused on outlining concepts and conveying those into propositions, that lay the foundations for future empirical testing (Witell et al., 2017), it provides empirical illustrations of effectual characteristics in EEP formulation and implementation, and a process that incorporates characteristics from the effectual approach. Observing these interventions from an effectual point of view can provide useful insights, and ways to improve the process. This is relevant considering governments, with respect to their support to EEs, must frequently deal with some of the issues that effectual theory addresses, namely uncertainty and the need to combine resources that may have alternative uses.

The fourth paper examines the evolution of an EE in a rural area of an emerging economy, where affordances enabled by digital technology were the key for the development of the ecosystem. For practitioners, especially for those engaged in developing ecosystems in resource scarce, peripheral regions, this research can provide insights on how to develop EEs in such regions, and the role that policies can have in promoting the development of digital affordances.

6.3 LIMITATIONS AND FUTURE RESEARCH

This thesis addresses an area where research is still incipient, a part of a relatively recent domain, which is equally undertheorized and fragmented. This provides a very stimulating subject of research, but also brings about important limitations. Namely the lack of previous studies that provide elements for additional validation. Another important limitation is imposed by most studies being still predominantly focused on western developed economies. Despite conditioned by the predominance of studies of developed countries, this thesis includes a paper that examines the emergence of EEs in Taobao Villages, a rural area of China. Fortunately, as the number of EE related publications is rapidly rising, these limitations will be gradually overcome.

The referred limitations are also promising areas for developing further studies, which also include developing and emergent economies. Each paper can provide an interesting research path for empirically testing its findings, thus opening up different avenues for future research, hypotheses testing and validation.

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