

## TOWARD A MODEL FOR THE POLICY REQUIREMENTS OF TECHNOLOGICAL ENTREPRENEURSHIP IN THE URBAN ECOSYSTEM

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### ABSTRACT:

Cities are creating an environment that encourages digital growth. Cities' capacity to facilitate and drive the development of a digital core system emphasizes the importance of cities in creating the necessary circumstances for a successful ecosystem - access to talent, access to funding, access to spaces and locations, and access to markets. Cities, on the other hand, can contribute to the creation of mechanisms such as co-investment funds, in which the public and private sectors share the risk of supporting new creative businesses. All facets of manufacturing, consumption, and regulatory services could be altered by digital technologies in our everyday routines. By introducing new capabilities and business models, as well as by influencing their environment and the policy systems that govern them, they will have a significant impact on entrepreneurial ecosystems. In this article, we are looking for a model that may express policy requirements of technological entrepreneurship in the urban ecosystem, based on knowledge about the importance and requirements of entrepreneurial ecosystems, the smart city approach, and the knowledge-based development strategy.

A comparative analytical method was used to conduct this research. We review the literature on ecosystems, urban ecosystems, smart cities, and knowledgebased urban development. Then we classified the parameters of each and presented how these categories are related in a model. In the research literature and in an executive position, dealing with a model for the policy requirements of technological entrepreneurship in the urban ecosystem can explain how the issue is operationalized, examine the city as an ecosystem where entrepreneurship occurs through technology and requires its own policies.

### 1. INTRODUCTION

Cities are providing a supportive environment for digital growth. Tracey Johnson, who agrees that cities may facilitate and drive the development of a digital core system, highlights the importance of cities in creating the necessary conditions for a successful ecosystem - access to talent, access to funding, spaces and locations, and access to markets. Cities, on the other hand, can help to build mechanisms like co-investment funds, in which the public and private sectors share the risk of supporting new creative firms (Audretsch and Lehmann, 2005; Audretsch et al, 2006; Acs et al, 2008).

Digital technologies, which perform a number of different tasks in our everyday routines, have the potential to alter all facets of manufacturing, user, and regulatory services. By introducing novel opportunities and business models, as well as by changing their environment and the regulatory frameworks that surround them, they will have a meaningful impact on entrepreneurial ecosystems. Because of this, every city-based ecosystem strategy should consider how to incorporate digital technology into ecosystem planning.

In this regard, the smart city approach is a good place to start. The knowledge-based urban development method has expanded beyond smart city and has addressed the four dimensions of economy, society, management/institutions, and built environment.

Dealing with a model for the policy requirements of technological entrepreneurship in the urban ecosystem in the research literature and in an executive position can explain how the issue is operationalized, examine the city as an ecosystem

where entrepreneurship occurs through technology and requires its own policies.

### 2. METHODOLOGY

This study was conducted using a comparative analytical approach. At first, we reviewed the research literature in the field of ecosystem, urban ecosystem, smart city and knowledge based urban development. Then we classified the parameters of each and presented in a model how these categories are related. In this way, the interface among Entrepreneurial ecosystems, smart city and knowledge based urban development which intend technological entrepreneurship in the model was determined.

### 3. LITERATURE REVIEW

#### 3-1. Entrepreneurial ecosystems

Economic development depends on entrepreneurial ecosystems (Audretsch and Lehmann, 2005; Audretsch et al, 2006; Acs et al, 2008), but this does not happen in isolation from the environment in which entrepreneurs make decisions (Marshall, 1920; Saxenian, 1994; Audretsch et al, 2006; Stam, 2008, 2014; Bosma et al, 2012) (Acs et al, 2014; Autio et al, 2014) (Sternberg, 2009; Estrin et al, 2013; Stenholm et al, 2013; Fritsch and Storey, 2014) (Audretsch and Lehman, 2005; Audretsch and Belitski, 2013, 2015; Ghio et al, 2014; Belitski and Desai, 2015) (Bosma, Schutjens and Stam, 2009; Fritsch and Wyrwich, 2014).

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A more systematic approach to promoting an entrepreneurial culture, improved information access, networks and entrepreneurial funding, information exchange, and infrastructure are becoming increasingly important to policymakers and academics (Zacharakis et al, 2003; Isenberg 2010; Rodriguez-Pose, 2013; Audretsch et al, 2015c) (Zacharakis et al, 2003; Isenberg 2010; Rodriguez-Pose, 2013; Audretsch et al, 2015c) (Napier and Hansen, 2011; Malecki, 2011; Feld, 2012; Wright, 2014).

Entrepreneurial ecosystems, according to Acs et al, (2014), are "a dynamic, institutionally ingrained interaction between entrepreneurial attitudes, skills, and aspirations by individuals, which drives resource allocation through the formation and operation of new companies." Community entrepreneurial ecosystems are those, according to the authors, that are presumably constrained by actual geographical boundaries. An entrepreneurial ecosystem is "an interdependent set of actors managed such that entrepreneurial action is enabled," according to Stam (2014). As well as with Feld (2012) and Stam (2014), Mason and Brown (2012) place high-growth companies with important management roles and R&D at the center of an entrepreneurial ecosystem (Bosma and Stam, 2012). The entrepreneurial ecosystem is described by Levie and Autio as a dynamic network of interdependent actors (entrepreneurs, suppliers, buyers, governments, etc.) and system-level institutional, informational, and social economic conditions in this work (Levie and Autio, 2014; Wright, 2014).

Daniel Isenberg (2010) defines the fundamental characteristics of an entrepreneurship ecosystem, emphasizing the need for a more holistic and dynamic approach:

- A favourable culture,
- Facilitating leadership and policies,
- Access to appropriate financing,
- Reliable manpower,
- Product markets that encourage entrepreneurship;
- A range of infrastructure and organizational factors supports

Given the conceptual model and physical constrictions of the entrepreneurial ecosystem, experts claim that many entrepreneurial decisions and resource accumulation by entrepreneurs seem to be made at the local level, which seems to be an appropriate aggregate level (Stuetzer et al., 2014; Stam, 2014; Stam and Nooteboom, 2011; Sternberg, 2009).

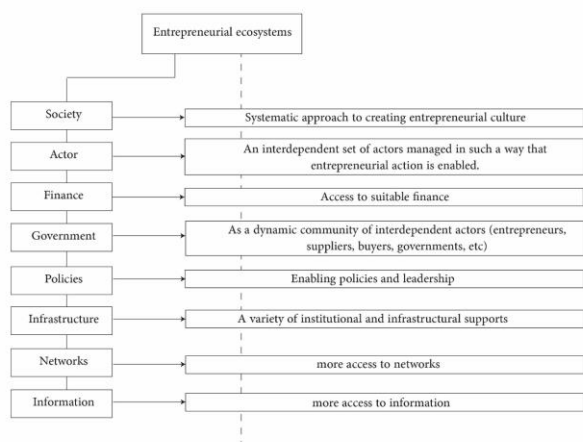


Figure 1. Entrepreneurial ecosystem element, illustrated by authors

### 2-3. City as entrepreneurial ecosystem

Cities are sources of opportunity for entrepreneurial approaches, not only with their physical base but also with the big data that they contain due to the development of technology. If cities are thought of as entrepreneurship ecosystems, by amenities and physical infrastructure, they will flourish and grow (Glaser et al. 2001). Transportation connections, amenities such as green spaces, theaters, museums, cinemas, coffee shops, and art galleries, can either promote or inhibit communication among the various participants in the entrepreneurial ecosystem. Infrastructure enhances links and connectivity, making it simpler to spot opportunities (Audretsch et al, 2015). Former emphasizes that connectivity and physical infrastructure is better for entrepreneurship because it enhances knowledge and information sharing and permits economic mobility. As a result, a region experiences even higher returns on investment. Along with providing access to cultural attractions, transportation and infrastructure support the growth of new high-tech businesses, corporate networks, and corporate communications in urban areas (Belitski and Desai, 2015).

Although there is little research on the connection between physical infrastructure and entrepreneurship, Woolley (2014) found that contextual infrastructure's design and configuration are crucial for new technology-based entrepreneurship in various industries.

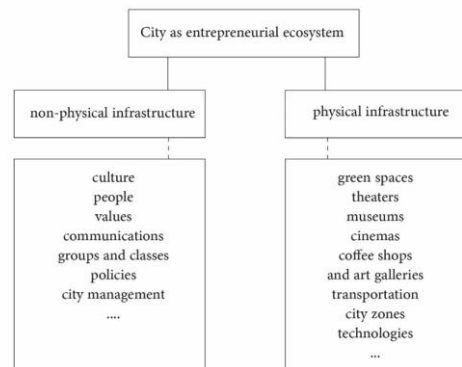


Figure 2. City as entrepreneurial ecosystem, illustrated by authors

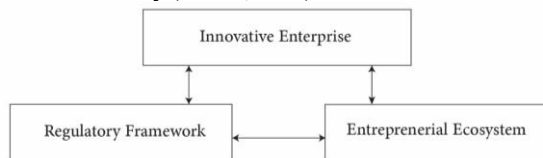
### 3-2. Smart cities and digital technologies

All facets of production, consumption, and regulatory services can be altered by digital technologies, which serve a variety of functions in our everyday routines. They will significantly alter entrepreneurial ecosystems by bringing new capabilities and business models, altering their surroundings, and affecting the regulatory frameworks around them. The Internet of Things (IoT), improved data analytics, artificial intelligence (AI), and virtual reality are some of the current trends in digital technology development (Cairney and Speak, 2000). The scope and speed of change brought about by digital technology are both expanding.

As organizations become interconnected networks with high levels of automation and real-time data access, technological changes will have a significant impact on global competitive frameworks (Cresswell, and Dawes, 2005). Client demands, which are now more technologically empowered, are further putting pressure on organizations' competitiveness (Cromer, 2010). This transition present business opportunities as well as challenges in areas like workforce management, smart services, and IT infrastructure (Cross, 2005). Every city-based ecosystem strategy should therefore consider how to integrate digital technology into ecosystem planning.

The smart city strategy is a good place to start in this regard. Smart specialisation plans for regions, which identify the region's competitive advantages, focus R&D and innovation efforts in these areas, and form a vision for regional innovation, are what gave rise to smart cities (Damanpour, 1993).

These concepts are applied at the city level in "smart cities," with an emphasis on ICT as a facilitator (Dawes & Bloniarz & Fletcher, 1999). Since the rise of ICT, A direct description of a smart city is still lacking. instead, there are common characteristics among ideas about current smart cities (Dawes & Cresswell and Pardo, 2009). The triple helix partners need a technology-based networked infrastructure to connect them. Other important elements include a creative class, business-led/entrepreneurial urban development, and economic and social sustainability (Dawes, 2004).



**Figure 3.** Smart city strategy toward entrepreneurial ecosystem, illustrated by authors

Several elements influencing the success of an entrepreneurial ecosystem are discussed in recent entrepreneurial ecosystem literature. However, academics emphasize the importance of local factors and bottom-up methods and they support customizing policy rather than replicating effective policies implemented in different locations (Abramson and Lawrence, 2001).

More crucially, they urge policymakers to develop policies for entrepreneurial regional economies rather than just entrepreneurship. (Al-Hader, 2009. This study emphasizes the creation of a city-based regulation that combines entrepreneurship and technology policies in order to support the ecosystem's growth and the creation of innovations.

Smartness in an urban refers to governance and policy issues as well as using high technology. Furthermore, embracing technology is not the ultimate goal; rather, it should be used in a clever way, which calls for intelligent management and policy. A smart city is one that has committed fully to innovation in management, technology, and policy. To make a city smart, technologies should be easily connected across systems and organizations (Brown and Brudney, 1998).

Technological performance should not be seen as a logical development from technological innovation; rather, performance is dependent on good management of technological systems and infrastructure. There is more to smart communities than just technological demonstrations (Eger, 2009). Technological potentials are enabled by organizational and policy innovation, and hence technological innovation necessitates organizational and policy innovation (Lee, 2008). Therefore, innovation is a change in management and policy practices to better meet a city's technological needs (Brown and Brudney, 1998).

We define the innovation in smart cities in terms of technology, organization, and policy as follows: Technological innovation is the process of modifying and improving technological tools to enhance services and establish circumstances that will allow the instruments to be used more effectively. Organizational innovation: a mechanism for developing management and organizational capacities for the successful application of technological tools and conditions. Policy innovation is a technique for addressing institutional and non-technical urban issues and creating conditions conducive to smart cities.

Examining the innovation context is also necessary. Different contextual elements depend on local elements. The unique

circumstances of each city have an impact on its organizational, technological, and policy features. A smart city is the result of the contextualized interaction of organizational, managerial, and technological innovation.

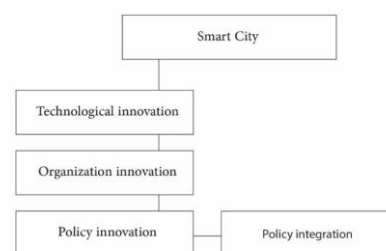
### 3-3. Smart city

A smart city is defined as the use of intelligence in municipal administration (Borja, 2007). A crucial competence for smart city is innovation. Management across Organizations Smart city innovation needs increased degrees of information and knowledge sharing and integration (Pardo and Burke, 2008). Governments are increasingly utilizing cross-organizational interoperability as a method of maximizing the value of information. The concept of interoperability is becoming more and more popular among institutions, industries, and political parties.

Cross-organizational leadership conditions is important for a range of managerial and leadership abilities. A network and enterprise of organizations are also led, in addition to a single agency, department, or team. While ICT-driven organizational and structural changes, such as networks, do not negate the importance of central leadership, they do promote collaboration among different players rather than hierarchical command and control (Ho, 2002). Leaders must therefore strengthen their network leadership skills. For a smart city initiative to be adopted successfully, strong leadership is necessary (City of Edinburgh Council, 2001).

Urban leaders can build a social infrastructure for cooperation that enables many groups to work together despite boundaries of jurisdiction and industry (Kanter and Litow, 2009). Technology is a tool, but policy innovation can help us use some tools more wisely. Innovative government places a focus on policy changes because it is impossible for government to innovate without a normative impetus (Eger and Maggipinto, 2010). While technological innovation may be seen and generally accepted, policy innovation is less clear (Hartley, 2005).

There are three key policy directions for innovation in smart cities. Regional, national, and even global connections between cities are shaped and altered by urban policy (Bai and Taylor, 2010). City innovation depends on the coordination of policies at various spatial scales, organizational levels, and governance levels.



**Figure 4.** Smart city elements, illustrated by authors

### 3-4. Knowledge-based urban development

Knowledge-based urban development theoretical framework has a crucial part in the development of society and the environment in the knowledge economy, in addition to economic growth and competitiveness. Cities, according to May and Perry (2011), are positioned as essential locations for meeting the challenges of knowledge-based growth in the twenty-first century. This is to suggest that, without a question, incorporating information in both tacit and explicit forms into urban design, development, and administration is a vital component of success in this new period. Despite the fact that

"[t]he twenty-first century is witnessing a new type of city form, the knowledge city, and a new approach to its development, knowledge-based urban development" (Yigitcanlar and Sarimin, 2011).

The goal of KBUD, according to the literature, is to create a city that is specifically designed to support the production and distribution of abstract labor—a knowledge city—through a new form, approach, or paradigm of development during the knowledge period (Yigitcanlar et al., 2008).

As a result, KBUD can be viewed as a paradigm with four major development domains: economic, socio-cultural, environmental, and institutional development (Yigitcanlar, 2012). By utilizing knowledge to generate economic benefits, particularly in high-technology businesses and services, as well as in education and R&D, KBUD seeks to establish a knowledge economy. For cities and regions to develop effectively using knowledge-based methods, sustainability and strategic organizational capabilities are essential (Nguyen, 2010).

In order to promote socio-cultural development, it is essential to work on improving citizen knowledge and skill sets. The goal of KBUD is to move society closer to becoming a knowledge society, where the creation, diffusion, use, integration, and manipulation of knowledge and information constitute a significant economic, political, and cultural activity (Gonzalez et al., 2005). High level accomplishments in the field of socio-cultural development are thought to be inextricably linked to a society's social and human capital (Frane et al., 2005).

With a KBUD viewpoint, 'enviro-urban development' (development of both natural and built environments) attempts to provide human needs while preserving the environment, so that these needs can be met not only in the present, but also for future generations.

Therefore, achieving sustainable KBUD outcomes and spatial formulation of city-wide sustainable KBUD strategies are essential for enviro-urban development, sustainable urban development (Yigitcanlar et al., 2008). (Yigitcanlar, 2010). The goal of "institutional development" from a KBUD perspective is to coordinate the city's KBUD and bring all the important stakeholders and sources together so they can strategically plan for the creation of knowledge cities and coordinate and enable necessary information-intensive activities (Yigitcanlar, 2009). KBUD aims to orchestrate the city's 'institutional development' and bring together all of the important actors and sources so that they may organize and enable necessary information-intensive activities and plan strategically for knowledge city formation (Yigitcanlar, 2009).

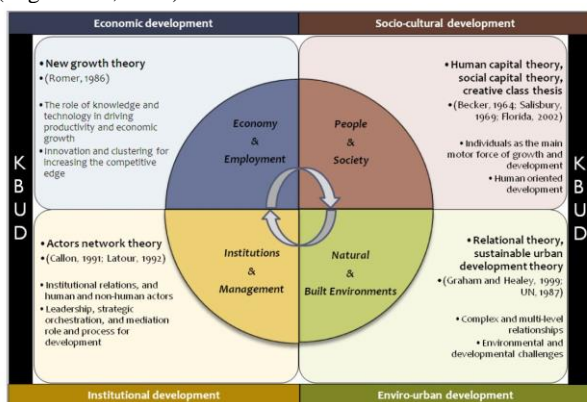


Figure 5. Knowledge-based urban development elements, (Yigitcanlar, 2009)

#### 4. CONCLUSION

For a model for the policy requirements of technological entrepreneurship in the urban ecosystem, it is needed to address policies aimed at promoting technological entrepreneurship in the four dimensions of social goals, economic goals, built environment goals, and management goals.

Based on the reviews of this article, the social goals that should be considered include the following :

1. Innovative Enterprise
2. Actors
3. Networks
4. Participation
5. Community benefits

Which can lead to Systematic approach to creating entrepreneurial culture with the help of Entrepreneurial ecosystem, smart communication and smart people.

The economic goals that should be considered include the following:

1. Access to suitable finance
2. As a dynamic network of interconnected parties (entrepreneurs, suppliers, buyers, governments, etc.)

Which can lead to community based economics with the help of smart economy and regulatory Framework. Built environmental goals that should be considered include the following:

1. Non-physical infrastructure
2. Physical infrastructure
3. Matching of supply and demand

Which can lead to integration of built environment with economy with the help of organization innovation and technological innovation. Management goals that should be considered include the following:

1. More access to information and networks
2. A variety of institutional and infrastructural supports
3. Enabling policies and leadership

Which can lead to a variety of institutional and infrastructural supports, with the help of organization innovation and technological innovation regulatory Framework and policy integration.

The following are the results and recommendations of this review:

1. The goal is to create a city-based policy that integrates digital technology and entrepreneurship ecosystems. The roadmap concept could assist policymakers in aligning cities' digital technology capacity with the capacity of their entrepreneurship environment.
2. Local governments formulate technological and economic policies that will lead upcoming economic growth. Understanding the decisions made at the city level by various stakeholders is necessary to recognize the impact of digital technology on city competitiveness.
3. The integrated framework will deliver information in two ways. First, by bringing together the complementary demands of entrepreneurship, industrial, innovation, and technology policies, the roadmap will help to integrative policy dialogue. Second, the systematic inquiry will increase the systemic application of digital technologies for enhancing entrepreneur competitiveness at the city level.

4. Policies related to infrastructure, networks and information in the city that are realized through the smart city and their promotion to the requirements of technological entrepreneurship in the city through integrated management systems .
5. Innovative policy making in terms of the four aspects of knowledge-based urban development in order to upgrade the smart urban ecosystem to a platform for technological entrepreneurship.

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