Smart Cities: The Role of Entrepreneurship for Urban Leftover Spaces

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Abstract: Smart City focuses on smarter solutions for the future to promote quality of life. Thus, the role of ICT interventions, innovations and creativity are emphasised to sustain economic and urban growth. The literature highlights business-led urban development is a major aspect of smart cities for entrepreneurship and identifies their inter-dependent role in economically efficient solutions. A barrier would be unused urban spaces as an inefficient allocation of resources. Entrepreneurship encourages innovation while smart cities adopt interventions that provide opportunities and a supporting environment for entrepreneurial activities. This paper explores the prospective relationship of using urban leftover spaces for entrepreneurial activities in smart cities. The study evaluates and analyses key attributes of entrepreneurship as to develop smart spaces for social sustainability.

1 INTRODUCTION

According to World Bank, urban population is expected to double by year 2030. With this rise in urbanization, globally researchers have started to talk about time-relevant solutions. One such attempt is the concept of smart cities, which has gained more attention in recent times. Smart city has been defined in various perspectives having multiple dimensions by respective stakeholders. Overall, a smart city can be defined as one that wisely uses natural and economic resources enhancing the social and human capital, employing tech-based solutions, to deliver improved quality of life by dealing with public issues and providing sustainable environmental solutions (Fernandez-Anez, 2016). Urban leaders have argued that smart cities have a lot more to do with "people" and not just "technological advancements". Whereas, the aim is to make cities more sustainable achieving improved quality of life with the smart and efficient use of modern technology (Stimmel, 2015). Woetzel et al., (2018) argues that smartness cannot be achieved by just installing an Information and Computer Technology (ICT) based infrastructure, rather a purposeful use of technology has to be ensured. To achieve this purposefulness, the role of human capital and urban planning is repeatedly emphasized for smart cities. The words "smart" and "purposeful" here indicate the value and necessity of human element that complements the employed technologies for smart cities. Thus, a smart city can assist and interest entrepreneurs, not just a digital city with high technological advancements. In fact, research has highlighted how digital cities differ from smart cities, focusing on the role of human capital for latter (Kummitha, 2019; Neirotti et al., 2014). Various researchers have divided broader objectives of a smart city into several components, such as smart governance, smart living, smart economy and smart environment (Giffinger and Gudrun, 2010; Lombardi et al., 2012). Yin et al. (2015) has defined a domain for smart cities that focuses at achieving growth for governments, citizens, businesses and sustainable environment. The importance of human capital and urban planning is highlighted for smart cities. Entrepreneurship encouragement is seen as a key attribute of a smart city to fuel innovation, which can lead to greater use of technology. Besides, Kummitha (2019) has highlighted the lack of attention in prior research on the relationship and potential of entrepreneurship to urban planning and as how it can be exploited.

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City characteristics are defined by urban development (Snieska & Zykiene, 2015). Urban design and planning concentrate not only at operational, structural planning and land usage but also on designing the physical features of the city to establish a relationship between the built environment and people (Shahreen & Voghera, 2019). Between stages of formal development, there are often spaces left unused, with unassigned functions, such spaces are generally termed as loose, vacant or leftover and are often perceived negatively (Azhar & Gjerde, 2016). These are indicative of inefficient usage of the physical infrastructure in a city, posing a socio-economic threat. Depending on the nature of such spaces, they have been classified into different categories, one of these leftover spaces after planning phase. Such leftover spaces emerge as a consequence of planning practices that leave gaps between urban fabrics. As a result, prior research has highlighted the potential of urban leftover private and public (semi) spaces which further raise questions to ensure their optimal use to minimise their potential negative threat due to staying idle. This paper attempts to fill this gap by focusing on urban planning and design as a tool for facilitating entrepreneurial activities in smart cities. It not only suggests a path for exploiting the relationship between the two, but also helps in stepping towards the goals of smart cities. This study will specifically focus on the goal to make businesses prosperous by creating enabling environment for entrepreneurs. There is an extant literature on smart cities, but it evidently leaves a void for research to explore more on how the human element in smart cities can further be utilised. Thus, this exploratory study attempts to explore the prospective relationship of urban leftover spaces and entrepreneurial activities for smart usage.

The paper begins by explaining a step-by-step method on how the study aims are achieved and followed by a comprehensive review of smart city definitions. To establish context, first it highlights the role of entrepreneurship for smart cities, the restricted role of ICT to facilitate entrepreneurship and literary evidence on urban planning and design as a tool for developing smarter city. This is followed by highlighting the need for optimal utilization of a city's built environment and leftover spaces in smart cities. In light of all these points, the paper consolidates the idea and presents how "smarter urban entrepreneurship" can be facilitated in smarter economies.

1.1 Research Methods

The study is elaborated in the following steps as:

Step 1 – Identifying the Aim of Research: the aim for this research is to propose the utilization of urban leftover spaces for entrepreneurial activities in smart cities.

Step 2 – Review of Extensive Literature: search engines are used as a starting point to search articles, several keywords related to the subject i.e., need for smart cities, resource management, entrepreneurship, economic growth and urban leftover spaces. After reviewing the abstracts/introductions/conclusions, relevant articles were shortlisted.

Step 3 – Identifying the Gap: there is sound literature on urbanism, entrepreneurship and how much entrepreneurship is stressed upon in relation to smart cities. However, there is a limited research on how this relationship can be exploited. As far as the tools of achieving smart city objectives are concerned, a majority of the emphasis is laid on ICT interventions, little focus is laid on the role of urban planning and human capital for the purpose. Research also establishes that even though entrepreneurship has key importance in smart cities, use of modern technology alone has a restricted part to play for it. This leaves behind ample space to explore the role of urban planning and design to encourage or facilitate entrepreneurship in smart cities.

Step 4 – Filling the Gap: this study focuses on the potential of urban planning and design as a mechanism to fill the gap identified in **Step 3** by proposing the smart use of urban leftover spaces for entrepreneurial activities in future cities.

2 REVIEW OF EXISITING LITERATURE

The section briefly examines the existing literature and relationship of smart cities, entrepreneurship and urban leftover spaces.

2.1 Defining Smart Cities

There is no conclusive definition of smart cities, however, prior research shows researchers have defined smart cities from various perspectives. The definitions proposed by researchers have evolved over time and these definitions vary depending on fields in which the researcher is involved in (Wenge et al., 2014). Researchers (Giffinger & Gudrun, 2010 and Lombardi et al., 2012) comprehensively

identified six characteristics of a smart city. The six characteristics are related to smart economy, smart human capital, smart governance, smart mobility, smart environment, and smart living. Here, the *smartness* implies an ambition to move toward an improved efficient urban development by wisely combining the existing planning tools. The term "smart" is referred to smarter planning, industry, inhabitants and use of technology.

2.2 Significance of Entrepreneurship

Although there is widespread consensus that ICT adoption would assist cities in becoming smart cities, there is no model to adopt or a smart city which has completely established as such. Yin et al. (2015) categorises the definition of smart cities into four perspectives i.e., technical infrastructure, application domain, system integration and data processing. Whereas, the application aspect focuses on providing sustainable solutions for governments, businesses, citizens, and environment. In making businesses more prosperous, one of the key sub-domains is to facilitate and promote entrepreneurship, with better logistics and encourage innovation. Problems of current era require time-based solutions, therefore, the role of innovation as a tool for smarter solutions has gained more focus (Dirks et al., 2010).

Caragliu et al., (2011) highlights six characteristics of utilizing networked infrastructure to achieve improved economic growth and urban development, business led urban development, social inclusion of urban growth, the use of technology and innovation for long run growth, importance of dealing with social and relational issues and finally, achieving social and environmental sustainability. Kummitha & Crutzen (2019) argues that key stake holders need to be brought together to achieve inclusiveness in smart cities. This can be done through (a) the government that has to formulate an effective plan to distribute resources and form market policies, (b) corporate entrepreneurship can be enhanced by providing technological expertise and knowledge, (c) Small and Medium Enterprises (SMEs) and social enterprises can be created through small-scale developmental interventions, and lastly, (d) citizens not only have to smart but an active participation for entrepreneurial activities is needed to address local problems with innovative but sustainable strategies. According to (Luke et al., 2007), the entrepreneurial activities can take place at an individual and organisational level. The individual entrepreneurs implement certain activities which can be innovative, and grows with time but involves risk in case of SMEs. However, in

the organizational level, the entrepreneurship can be viewed from two perspectives – individual business entities within an organization or 'intrapreneurship' and the organization as a whole or 'corporate entrepreneurship'. Business-led urban development focuses on providing a suitable enabling environment for businesses. Cities with a higher level of business activity show better socio-economic performance. Under the broader aim of smart cities to achieve sustainable growth, one of key objectives is to achieve it through promoting innovation and facilitating entrepreneurship (Bjørner, 2021).

2.3 Restricted Use of ICT for Entrepreneurship

Neirotti et al., (2014) classifies smart cities into hard domains and soft domains, this classification is based on the importance of ICT (see Table 1). Hard domains are the ones for which sustainable solutions rely significantly on ICT systems, along with urban planning and policy interventions, also includes transport, natural resources, buildings, environment, and energy grids. Soft domains are the ones for which ICT system has a limited part to play and includes areas such as education, culture, policies that foster entrepreneurship, innovation and social inclusion, as well as communication between local public administrations and the citizens (e-government).

Table 1: Neirotti et al. (2014)'s characterization of smart city domains based upon role of ICT.

Hard Domains	Soft Domains
Energy grids	Education and culture
Public lighting, natural resources and water management	Entrepreneurship, innovation, social inclusion and welfare
Waste Management	Public administration and (e-) government
Environment	Economy
Transport, logistics and mobility	
Office and residential buildings	
Healthcare	
Public security	

2.4 Urban Planning as a Tool for Encouraging Entrepreneurial Activities

Kourtit and Nijkamp (2012) highlights the importance of smart urban planning and defines as a promising mix of human, social and entrepreneurial

capital. This structure ought to be supported by adequate government interventions and citizens who look forward to innovation driven growth. The urban theory put forward by International Business Machines (IBM) explains that the smart city concept stands on three pillars i.e., people, management, and infrastructure. 'People' is categorised to provide human services in education, social programs and healthcare for citizens. Management and planning services are further divided into urban planning and smarter buildings, public safety, and governance (Söderström et al., 2014). To sum up, smart cities are distinct from digital cities, the role of ICT is to develop a city's digital nervous system that obtains and manages data centrally. Research highlights the importance of human capital and planning, to ensure "smart" use of ICT for transforming cities (Neirotti et al., 2014). Caragliu et al., (2011) argue that a city can be characterized as smart, where efficient allocation of social and human capital along with use of ICT ensures sustainable solutions for the future having government's monitoring role. Overall, smart cities' space can be defined as using ICT interventions, policy mediation and urban planning procedures for wiser management of resources to attain sustainable socio-economic solutions.
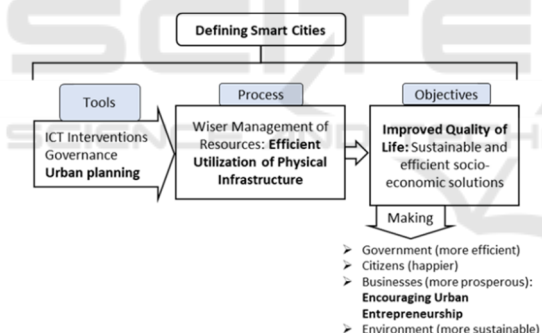

Figure 1: Detailed outlook of Smart Cities.

Above figure 1 summarizes the definition of smart cities, where the broader aim of a smart city is attaining higher and sustainable growth. The focus is to ensure all major stakeholders of a city i.e., the government, citizens, businesses, and environment are better off in the future. In literature, the connection that is made between these three, from a smart city perspective is, to focus on the use of modern technologies and innovation to encourage entrepreneurship for steady growth, having citizens who open-mindedly accept and adapt to it. This setup further needs a government's contributory and monitoring role to be played efficiently through urban planning and policy interventions. The growth in

context of a smart city thus must be smart, sustainable, and inclusive (Arroub et al., 2016).

3 EFFICIENT UTILIZATION OF PHYSICAL INFRASTRUCTURE

Smart cities claim to provide solutions for emerging city problems, especially the increased pressure on environment and economic infrastructure. This suggests sustainable solutions imply minimum wastage of resources (Bjørner, 2021) and efficient use of abandoned land. Stimmel (2015) introduces the concept of smart city that focuses on most efficient utilization and management of resources, while ensuring minimum wastage. As it is expensive to build smart cities (Ejaz and Anpalagan, 2019), the analysis suggested that the emphasis on utilization of resources in the most efficient ways can be a part of the core vision of smart cities. A key component of smart cities is a well-integrated ICT infrastructure for which urban planning and urban design play an important role. Urban planning for smart cities suggests little about green urban spaces and consequently how environmental sustainability will be achieved (Anguluri & Narayanan, 2017). As discussed earlier, along with an integrated ICT structure, a smart city also needs adequate governance and inhabitants with open and growth mindset, but relatively little focus is laid on governance and change in mindset of human resource (Tay et al., 2018). Chourabi et al., (2012) discusses the role of ICT for smart cities but pinpoints the need to explore the importance of organization and management of smart cities. The limited research on perceived challenges associated with smart cities highlight the technical issues, economic costs, and threats to natural environment. Even though smart cities promise to put forward sustainable solutions, but the question stands, are they really sustainable? The beautification of built environment at the cost of deteriorating natural environment may not lead to the desired results of improving quality of life for people. Where broad research can be found on the architecture of smart cities, little is known about the geography and spatial planning for them (Yigitcanlar, 2015).

Smart cities promise efficient utilisation of the physical infrastructure, encouraging citizen participation, learning to innovate and adapt, hence responding to changing environments and situations swiftly (Jaššo & Petríková, 2019). This implies it is important to ensure urban spaces are most efficiently

utilized in a smart city. The study urges urban leaders to concentrate especially on such spaces which emerge amid planning and design of city, are obsolete, having no use. This is where the concept of place branding comes in which entails assigning some significance to a place. Strategic branding of a place can lead to generation of its economic value and contribution to the city (Bašová & Štefancová, 2017).

3.1 Connecting the Dots

The definition of smart cities can be divided into two components: their objectives and the tools that can be employed to attain smart city goals (see figure 1). Broadly discussing, the objective of a smart city is to enhance the quality of life by providing smarter answers for the future and attaining efficient and sustainable social, economic and environmental solutions. Specifically, the aim is to take advantage of technology to help all major stakeholders of an economy, i.e., government, businesses, and citizens cope better with the challenges of tomorrow.

3.1.1 Smarter Entrepreneurship

It is important to understand that the concept of smart city is not only confined to the existence of a well-integrated ICT infrastructure, rather the planning and use of this infrastructure is also important for enabling smarter solutions. Thus, "smart" in smart cities is an indicative of use of technology to provide better solutions for futuristic problems, it is important to establish that having a well-integrated ICT system is a part of the smart city concept and not the entire concept. Innovation and entrepreneurship are the key contributors to discovery of sustainable solutions. Most of the literature lays great emphasis on both to develop smart cities. Smart cities and entrepreneurship in fact have a bi-directional relationship, where each complements the other. The aim of smart cities provides better, time relevant solutions for tomorrow through efficient utilization of ICT that needs to be backed by innovation and entrepreneurship. In return, establishment of smarter cities promises to provide an enabling environment for entrepreneurs. In a smart city, whether it is social inclusion, social and environmental sustainability, business-led development, use of ICT, high-tech industries or relational capital, all contribute to encouraging entrepreneurship (Yin et al., 2015; Neirotti et al., 2014; Dirks et al., 2010; Hollands, 2008; Richter et al., 2015).
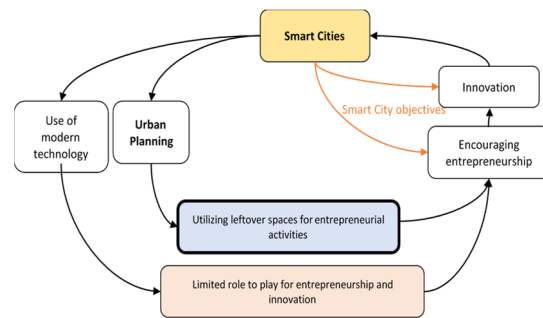

Figure 2: The bi-directional relationship between smart cities and entrepreneurship established in literature and proposed by this study (in blue color).

Henderson & Weiler (2010) put forward empirical evidence validating that the advantages of entrepreneurship in urban economies are more eminent. Among a few major reasons for this are low transaction costs and bigger markets in urbanized cities. Greater number of skilled individuals in cities means a greater chance of entrepreneurial activities. The role of human capital is highlighted for urban development, as entrepreneurship attracts skilled labour by creating greater labour demand, this is why higher skill levels could lead to more growth in cities (Caragliu et al., 2011; Berry & Glaeser, 2005). As discussed earlier, a distinction can be made of the things that rely heavily on ICT and those that rely on ICT to a much lesser extent. Among the latter are innovation and entrepreneurship, which even though, hold great importance in the futuristic problem-solving approach, have limited role of ICT to influence from. Figure 2 illustrates the relationship established in literature of smart cities and entrepreneurship. However, the opportunity for finding a relationship can be exploited.

3.1.2 Smarter Usage as Tactical Approach

In cities, the tactical urban movement can be seen as a smart solution for individual entrepreneurs, wherein people improve urban design and bringing about a positive change in their surroundings by providing certain functions, culminating in cities to become even more sustainable (Planning Tank, 2016). Minor improvements to vacant urban spaces might be the first step in this direction. This method, which would be low risk but potentially highly rewarding, becomes a deliberate or phased strategy to instigate change by offering local ideas for local planning challenges, short-term commitment, and realistic outcomes, and it could become a deliberate or phased approach to instigate transformation by offering local ideas for local planning challenges,

short-term commitment, and realistic outcomes (Pfeifer, 2013). The tactical approach provides low-cost, adaptable processes that transform the cityscape into such an urban laboratory where people could test out their differing ideas. Making gradual changes in voids could result in a new opportunity for the entrepreneurs and planners to explore and experiment with multiple ideas. There are primarily two types of this approach. Temporary interventions are lighter, quicker, and less expensive, but they are nevertheless effective tool for creating better urban settings (Turner, 2013). Most of these initiatives are small in scale, such as impromptu seating along roadways and tiny parks, but some have converted whole parking lots and roads into temporary green spaces, offering users a glimpse of what is possible (Voigt, 2015). These bottom-up approach may appear to become a coordination issue for municipalities and other agencies, but they could potentially coincide with long-term planned policies and last at least a year.

The 'planned' approach, on the other hand, involves strategically modifying spaces and concentrates on initiatives such as infill development and drafting of guidelines. Permanent projects, have far greater expenditures and require a longer and more sophisticated approach. One of the most difficult obstacles that the strategically planned method faces is actively engaging the community (Voigt, 2015). The idea is primarily a collaborative one, in which local residents must discover possibilities for tiny moves or projects rather than introducing fundamentally new forms of transformation on a wider scale. Letting space, City Lab, Street-Plans New York, Do-It-Yourself urbanism, and City repair are all projects that highlight the importance of empty spaces by creating spaces that are designed to be used by the public. Thus, the urban landscape should not be considered as something static, but as something vital with the need to achieve a coherent design solution at each change point that is considered beneficial for the community and generates economy.

Bjerke (2010) discusses the connection between spaces and entrepreneurship, and also identifies three types of entrepreneurial situations and their respective spatial needs. There is entrepreneurship going in market, institutions and public. Azhar et al. (2020) highlights a potential of public and private urban leftover spaces that may pose a threat to the social, spatial and environmental setting of a city and identifies several positive uses of them by classifying them into different types. Leftover spaces are defined and seen as abandoned spaces, which have no particular use or functionality. The threat they pose

and the potential they hold may vary for each. The existence of public and private leftover spaces in cities would indicate inefficient spatial management. Specific to the context of smart cities, leftover spaces can be seen as spaces of potential to contribute positively due to limited land in cities. This proposal of utilising such obsolete spaces present in a smart city would yield the following benefits:

1) *Better resource management:* Categorizing leftover spaces as a resource in smart cities, their positive utilization through design interventions would mean lesser wastage and more efficient resource management.

2) *Cost-effective solution*: As the solutions smart cities offers are critiqued to be expensive, utilisation of leftover spaces could provide much cost-effective solution. It could, in-fact become a source of income generation for whoever holds property rights to the spaces.

3) *Support entrepreneurship:* Entrepreneurs need space to operate, availability of leftover spaces for them could provide them a lost-cost space to operate in. Further research needs to done on what type of leftover spaces would be preferred for supporting entrepreneurial activities.

The proposal laid forward by this study not only directs a phenomenal way of utilising wasted resources in smart cities to attain their objectives but also paves the way for a whole new area of research related to smart usage of urban leftover spaces. Some of the eminent research agendas related to this are given below:

1. First, the entrepreneurs and their preferences towards the features and specific types of leftover spaces need to be tapped. These preferences are related to design transformation of the vacant spaces to make them useful for entrepreneurial activites.

2. Second, considering smart cities and what they aim to achieve, the uses of smart urban vacant spaces can further be explored in multiple dimensions. This will be especially insightful if the leftover spaces are categorized into different types according to their potential usage for entrepreneurship.

3. Needs of entrepreneurial spaces and the perception of urban leftover spaces needs to be further exploited.

4 CONCLUSION

Smart city is a concept that has gained significant attention by researchers in recent times, however the focus as majorly been on the ICT side. The role of urban planning has been emphasized and the need to dig deeper into exploring potential of urban planning and its contribution to smart cities has been raised. This paper reviews literature on smart cities particularly highlighting the objective of smart cities to provide improved quality of life by employing efficient and sustainable means. In addition, it focuses on the need to utilise resources, particularly the physical infrastructure as an urban planning strategy for smart cities. Among the characteristics of smart cities is to encourage entrepreneurship and innovation, this study suggests the use of obsolete urban spaces in efficient ways for entrepreneurship. This will not only ensure proper utilization of smart urban leftover spaces but will also facilitate entrepreneurial activities. They paper concludes on highlighting the significance of urban planning and urban design as contributors for achieving smart city objectives and paves way for future research in the area.

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