

# The future of work in the smart city: Managing virtual work by leveraging smart cities to achieve organizational strategy

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## Abstract

The goal of the organization is to maintain and increase productivity of its resources including human capital. A clear assessment of all the available resources to management provides requisite information to enable them to allocate work tasks and monitor and assess outputs. The way work is done is changing across most industries and the future of work is one that has been celebrated and researched by experts and scholars alike. The ongoing COVID-19 pandemic has opened up the virtual work sphere as a paradigm for all organizations to explore, and many otherwise traditional work arrangements are beginning to innovate around how their work functions are achieved. This paper explores the concepts of smart cities, the future of work and virtual work. And through a mixed method of interviews and surveys identifies how organizations are leveraging on the advantages of smart cities in planning and implementing work arrangements for their employees in order to cope with the current pandemic and what their strategy would be overall when the situation comes back to normal. About 8 top managers were interviewed and 59 employees currently working virtually were surveyed. Responses were analysed and connectivity, flexibility and autonomy were identified as factors organizations considered as they planned and implemented virtual work arrangements. And their outlook for the future certainly included virtual work arrangement for at least a fraction of their employees as working from home, cafes, hotels etc has become a norm today and is generally accepted as a legitimate work arrangement between organizations and their employees.

**Keywords:** Smart cities, virtual work, future, organizational strategy.

## 1. Introduction

The advancement in information and communications technology, urban development and the ongoing pandemic has resulted in a paradigm change in organizations, with many organizations now adopting the virtual workplace. The evolution of smart cities will have a huge influence on virtual workplaces and how they achieve their strategic goals in the local community. The virtual workplace consists of geographically dispersed teams/employees who work remotely from each other, and who depend largely on information and communications technology (ICT) for collaboration. Virtual teams allow companies to be more flexible, adaptive and responsive by crossing time, borders and continents [1], [2]. Cascio and Shurygailo [3] argue that companies benefit from implementing virtual teams due to the cost savings on office space. According to a 2017 global survey of over 24,000 workers, 62% of the working population are now working flexibly and a whopping 98% say that virtual working makes them more productive (Global integration “n.d”). A smart city is defined as a geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development [4]. The United Nations

estimate that between 2015 and 2050 the world population will increase by 32%, i.e. from 7.2 to 9.7 billion inhabitants, while the urban population will increase by 63%, from 3.9 to 6.3 billion inhabitants. The continuous increase in population of cities and the complexity of city management drive local governments towards the strong use of technologies to support a higher quality of urban spaces and a better offering of public services [4]. The smart city leverages on the use of information and communication technologies (ICT) to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life, and environmental footprint - all supporting innovation and the low-carbon economy.

Smart cities foster better IT infrastructure and higher usage of ICT and smart digital devices compared to their rural counterparts. Thus, smart cities generate large amounts of data related to people, economy, infrastructure, culture, environment, urban living, and decision-making which organizations leverage upon to achieve their strategic goals. These data are gotten from social media, city information sources and the Internet of Things (IoT) data sources. The trend towards greater remote and virtual working looks set to continue as more and more companies embark on a digital transformation. Virtual work happens mainly with ICT, sharing information and collaborating at a really high rate, where workers formally report to different managers and may or may not be remote [5], [6]. The key issue is how to lead through influence rather than hierarchy and the ease of communication for the purpose of creating value [5], [6].

As more and more enterprises embark on a digital transformation, the trend towards more remote and virtual work looks set to continue. Digital work occurs predominantly with ICT, exchanging data and communicating at a very high pace, where employees report formally to various supervisors and may or may not be remote. For the purpose of generating value, the main issue is how to lead by power rather than hierarchy and the ease of communication.

### ***1.1 Characteristics of smart cities***

Smart cities are not new spaces, just cities that can be named like that, thanks to continuous technological evolution. A smart city of the future has a governor that includes all facets of everyday life with technology, with the goal of bringing a better future to people and their next generation. Moreover, in order to prevent traffic collapses at rush hours, a smart city also cares about enhancing transport, among other features we will list later on.

Smart cities evolve towards a strong integration of all dimensions of human intelligence, collective intelligence, and also artificial intelligence within the city [7]. The intelligence of cities "resides in the increasingly effective combination of digital telecommunication networks (the nerves), ubiquitously embedded intelligence (the brains), sensors and tags (the sensory organs), and software (the knowledge and cognitive competence)" [8]. Much of the information/data collected by smart cities are used to Make more efficient use of physical infrastructure (roads, built environment and other physical assets) through artificial intelligence and data analytics to support a strong and healthy economic, social, cultural development [9], engage effectively with local people in local governance and decision by use of open innovation processes and e-participation, improving the collective intelligence of the city's institutions through e-governance [10], with emphasis placed on

citizen participation co-design [11], [12], [13], learn, adapt and innovate, thereby responding more effectively and promptly to changing circumstances by improving the intelligence of the city [10], [14].

Table 1. Characteristics of smart cities

Characteristics/Benefits	Description
Economy	Well-developed flexible labour market with economic trademarks, innovative spirit, entrepreneurship, ability to transform and productivity.
Smart people (human and social capital)	Creative, open-minded and flexible people with high level of qualification, affinity to lifelong learning, social and ethnic plurality and participation in public life.
Governance	Participation in decision making, public and social services, transparent governance
Transportation/Mobility	Sustainable, innovative and safe transport systems with local and international accessibility.
Environment/Natural resources	Environmental protection, tourist attractions, sustainable resource management
Quality of life	Abundance of basic amenities such as housing, educational facilities, healthcare. Safety and protection of lives and properties, social cohesion, cultural facilities.
Information and communications technology (ICT)	Availability of ICT infrastructure

*Source: By authors*

## 2. Theoretical review

Resource Based View is an approach that originated in the 1980s and 1990s, following the major works published by Wernerfelt, B., to gain competitive advantage. ("The Firm's Resource-Based View"), Prahalad and Hamel ("The Corporation's Core Competence"), Barney, J. ("Firm resources and competitive advantage sustained") and others. The advocates of this view claim that instead of looking at the competitive environment for it, companies should look within the company to find the sources of competitive advantage. This perspective views organizations as consisting of a variety of resources, generally including four categories: physical capital, financial capital, human capital, and corporate capital resources [15].

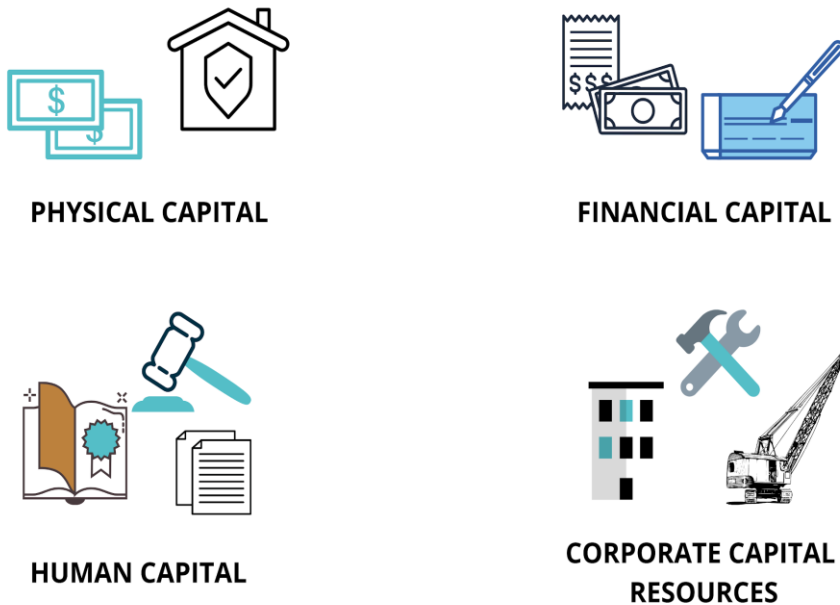


Figure 1. Description of the four categories.

*Source: By authors*

Since resources can either facilitate or inhibit firms from efficiently conceiving and implementing business strategies, the attributes of resources held by firms determine firm performance heterogeneity. Resources that allow a firm to conceive and implement strategies that improve its efficiency and effectiveness are viewed as valuable, and can be a source of competitive parity [16]. Resources that are valuable and rare, or valuable and are possessed only by a small number of firms, can be a source of competitive advantage. Resources that are valuable, rare, and inimitable, can be a source of sustained competitive advantage [15]. Moreover, to achieve a sustainable competitive advantage, a firm needs to have the ability to exploit the full competitive potential of its valuable, rare, and inimitable resources [15]. Such ability often resides in the firm's structures, procedures, and practices.

Organizational change is a strong impact factor, especially on management functions related to resource coordination and training. In spite of all the difficulties faced, the adoption of particular methods for managing change emerges as a complicated but necessary continuous process. A significant job for the group manager is to decide how the group members agree on what the group is expected to do, how things need to be done and when the group needs to work together [17]. Management's essential job is to push change, since the world is constantly evolving and competition seems to be high. Management is increasingly focusing on encouraging change and promoting adaptation and creativity, with a view to developing products and services and meeting new pressures and demands. Kurt Lewin believes that transition is a complex equilibrium mechanism in which different forces, as set out in the formal organization, are pressing to change the parameters, while at the same time generating a strong resistance to any system transformation in its entirety

or in its partial components [18]. The following may be the most significant determinants of change: technological change, a high rate of product aging, improved working conditions, a flood of new knowledge. And resistance to change is caused by: outdated mentalities, mental blockages of individuals or groups, disinterest, fear of the unknown and fresh, fear of potential failures, low level of professionalism, work disruption.

In response to more and more changing environments, managers are forced to build strategically versatile organizations. Fortunately, a new generation of ICT offers the foundations for resilient new models of organization that would not have been feasible only a decade ago [17]. The virtual workplace, one of the most exciting of these new forms, will allow organizations to become more agile by offering the amazing productivity of team-based designs in environments where it would have once been difficult to work together [18]. Virtual teams, mainly connected through advanced computer and telecommunications technology, provide a powerful response to the challenges associated with downsized and lean companies today, and to the resulting geographical dispersion of essential employees. New workforce demographics are also addressed by virtual workplaces, where the best workers can be placed anywhere in the world, and where employees demand increasing technical maturity and personal versatility. Organizations can build teams with maximum membership by virtual teams while maintaining the benefits of a flat organizational structure. In addition, firms benefit from virtual teams by accessing previously inaccessible knowledge, enhancing cross-functional coordination, and using systems that improve the efficiency of the work of the virtual team [19].

The virtual workplace is discussed in the context of sustainability within the framework of this work; it offers a range of economic, environmental and social benefits, primarily due to the elimination of the need to travel to the workplace, if working from home, or the reduced time and distance traveled to a coworking room. Taking this into account, the virtual workplace contributes to resolving alarming environmental problems and to the move towards the development of smart cities and communities [20]. Digital and telecommunication technology are used in a smart city to make conventional networks and utilities more effective for the benefit of its people and businesses. In essence, this applies to smart urban transport networks, enhanced water supply and waste disposal facilities and smart energy-efficient buildings, all of which save energy and material capital and mitigate carbon emissions [21]. The latest COVID-19 pandemic offered especially useful lessons, both related to remote working and smart cities. Through this crisis, the lockdown conditions imposed by governments worldwide have triggered the transfer of a significant number of daily activities from business and office environments to homes within a very short period of time. In view of this the potential for the role of the virtual workplace has arisen in the future of smart cities [20].

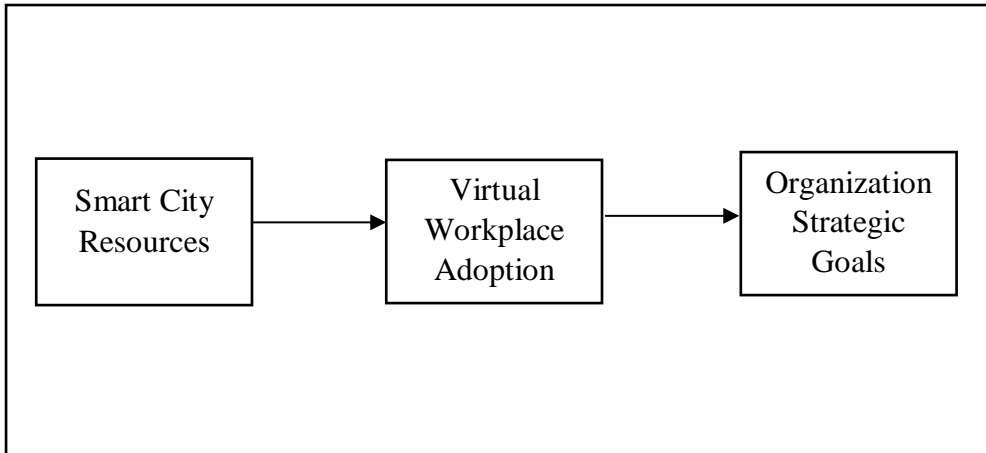


Figure 2. Models of leveraging smart city resources for virtual workplace adoption  
 Source: By authors

### ***2.1 The role of virtual workplace in smart cities***

The opportunities offered by the tremendous strides in the creation of technology and processes for automation and data sharing bring great potential for European cities to optimize the productivity of systems that will turn them into smart ones [20]. Smart cities provide elements of integrated planning, policies and legislation, sustainable districts and the built environment, sustainable urban mobility and integrated citizen-centered infrastructure and processes [22]. Advances in ICT have inspired the notion of smart cities. Smart Cyber-Physical Systems (CPS) automation with decentralized control and advanced networking allowed by Internet-of-Things (IoT) functionality is their technological foundation.

These systems have both physical and virtual identities, where smart sensors measure and collect real-time data stored in data clouds and distributed through internet networks, allowing for a continuous flow of information between a variety of devices, components and systems [23]. Internet-of-Services (IoS) and Internet-of-Energy (IoE) are also critical aspects of smart cities, which decide how natural resources and networks, including power, gas, transport, water, public services, data and buildings, are properly handled and used [24]. In addition, on the basis of intelligent cross-linked value development modules, the allocation of resources, including goods, materials, electricity, fuels, and water, can be more efficiently realized [25]. Up-to-date and real-time information and data that can be gathered and transferred using CPS systems can ensure that timely and effective steps are introduced to keep the city's operations running in stable and safe environments, while saving money and reducing carbon emissions are achieved. With the incorporation of multiple services at different levels, including BIM, IoT [26], CPS, cloud computing, and fog computing into comprehensive smart city solutions, processes and operations can be improved and optimized across all areas of the city, including electricity, mobility, water, public services, buildings, and data centers [27].

Smart cities, with particular reference to the transport sector, strive to enhance the quality of life of their residents, as well as to boost the economy by encouraging sustainable urban mobility and increasing the use of clean and energy-efficient vehicles. However, their introduction is also expected to resolve additional political issues, including climate change, energy policy, regulations on air quality and the challenges of managing congestion. Remote work therefore has considerable potential to contribute to the development of smart cities, given that its advantages are largely due to the reduced need for transportation. The fact that remote work leads to a reduction in the use of transport fuel and thus to a reduction in CO<sub>2</sub> emissions, a reduction in air pollution and traffic congestion contributes to the goals of the European Commission to increase mobility while minimizing congestion, injuries and pollution in European cities.

### **3. Methodology**

The proposed model has been validated by an empirical study based on interviews. Structured interview questions were used for data collection, as this is mostly used by researchers in carrying out a systematic investigation into specific subjects and contexts [28]. The interview questions were designed based on the proposed model on how smart cities resources are leveraged to adopt a virtual workplace for the purpose of achieving organizational strategic goals. It therefore emerges that a smart city is a polyhedric strategy, putting together ICT resources, knowledge and environment safeguard in adopting a virtual workplace thereby improving quality of life in the urban, achieving organizational goals and promoting innovation and community building [26].

Several professors were interviewed to modify the statements and the construction of the interview questions. Then, a sample of 8 managers belonging to different large organizations in Lithuania and internationally was selected randomly based on their experiences in virtual workplace adoption in smart cities. Interview was carried out via videoconferencing. We excluded employees from the sample set because they are not real managers of the virtual workplaces by definition. The organization managers were asked to share their experience on how organization strategic goals can be achieved through virtual workplace adoption in a smart city [29].

Many researchers proclaimed smart cities target the improvement of the quality of life of its citizens, as well as the strengthening of the economy through the promotion of sustainable urban mobility and the increased use of clean and energy-efficient vehicles. Yet, their realization is also anticipated to tackle additional political challenges including climate change, energy policy, air quality legislation and the difficulties of tackling congestion. Accordingly, given that its benefits primarily arise from the reduced need for transportation, virtual smart cities have significant potential in contributing to the adoption of virtual workplace [30]. Based on this, the following hypotheses have been proposed.

**H1.** Utilization of resources within smart cities helps organizations in adopting the virtual workplace.

**H2.** Adopting the virtual workplace helps organizations achieve their strategic goals



#### 4. Results

The results of this analysis are consistent with the current research papers released at the time of the COVID-19 pandemic. Kanda and Kivima's work concluded that the long-term effects of the pandemic would cause more permanent changes related to the digitalisation of work and other day-to-day operations in smart cities, resulting in decreased mobility needs and overall consumption of fossil fuels. This implies that lots of local and international organizations are leveraging smart city resources to achieve their organizational goals. In addition, by conducting the same study for a wider population sample and/or for various business sectors, more indicative values for the effect indicators could be obtained. This method of research would greatly increase the reliability of the outcomes of this study and overcome the related limitations and weak points associated with the approach applied [20].

Impact indicators can provide useful guidance and raise awareness of the virtual workplace's environmental benefits. Any size of organization that aspires to raise its sustainability level by implementing simple solutions can use the methods adopted in this work. In addition, taking into account the fact that the transport sector is a key player in achieving smart cities with goals for reducing congestion, injuries and air pollution in smart cities, virtual workplaces will make a major contribution to the development of sustainable models of urban mobility [19]. This work can also be used as a reference guide for policy makers to perform a more thorough analysis of the organizational benefits that could result from the implementation of regional or national virtual workplace models. Such numerically justified and credible studies will contribute to the creation and implementation of national virtual workplace policy structures, while at the same time contributing to the development of sustainable urban and regional futures, strengthening a strong workplace culture and encouraging the adoption of effective operations.

The survey subjects were selected from 8 different organizations in Lithuania and international, both manufacturing and service oriented companies. A manager with 3–10 years of work experience in his or her current position was selected from each company and interviewed based on our structured questions. Each question was asked based on the objectives of the survey and guaranteeing respondent privacy. Each respondent was asked to give explanatory statements on each of the responses for clarity. The survey was completed within 1 week of the interview being carried out in November 2020. A total of 25 interview questions were asked to the 8 company managers [31].

The table below shows that the respondents had an average of 6.2.5 years of general managing experience and an average of 2.5years of managing a virtual workplace in a smart city.



Table 1. Profile of the respondents

Characteristics	Number / Arithmetic
<b>Gender:</b>	
Male	5
Female	3
<b>Manager Description:</b>	
Manufacturing Managers	2
Service Oriented Managers	6
<b>Experience:</b>	
General Manager Experience	Mean = 6.25
Virtual Workplace Managing Experience:	Mean = 2.50
<b>Smart City and Virtual Workplace:</b>	
Smart cities resources contribute to virtual workplace adoption.	Agree=7, Disagree =1
Adopting virtual workplace helps in achieving organization strategic goals.	Agree = 5, Disagree = 3

*Source: By authors*

## 5. Discussion

Smart cities increase productivity and make it easier for teams to accomplish their everyday activities, making the process simpler using state-of-the-art technology. With a fully serviced and linked setup, IT enterprises, design studios and web development firms can all benefit. Those working in laboratories and testing facilities can run safely with excellent security and data protection outside office life [32]. Both warehousing and development are evolving as the power of IoT technology is harnessed by businesses including Amazon and Boeing. As in any team setting, managers would need to clearly define standards for the performance of the virtual team and parameters for measuring the progress of the team. Effective monitoring and control of the virtual team can seem troublesome due to the dispersion of team members. However, the rich communicative atmosphere of the virtual team, along with the ability of the system to store data and messages, potentially empowers far more managerial oversight than is possible in conventional environments. For example, managers might actually display recorded transcripts of team meetings to determine the contribution of participants and team development [20]. Finally, it is important to clearly define the reporting and managerial relationship between the team and its outside manager or managers. Again, since none of the team members will necessarily be located in the same location as external leadership, it is important to create consistent timelines of when updates, interim deliverables, and final product will be delivered by the team. It is also critically important that the role of the virtual team is clearly defined by executives within the context of the company's greater mission, including the limits of the team's scope and responsibility. This will assist the team to concentrate its energies on activities that support the organization's strategic goals using the smart city resources [19].

In addition, we describe a smart city as one with a comprehensive commitment to technology, management and policy innovation. The transformation potential of smart technology (such as smart sensor instrumentation), mobile technologies, virtual

technologies, cloud computing, and digital networks such as Mobile Wireless and Metropolitan Area Networks (MANs) is harnessed by a smart city as an innovation [33].

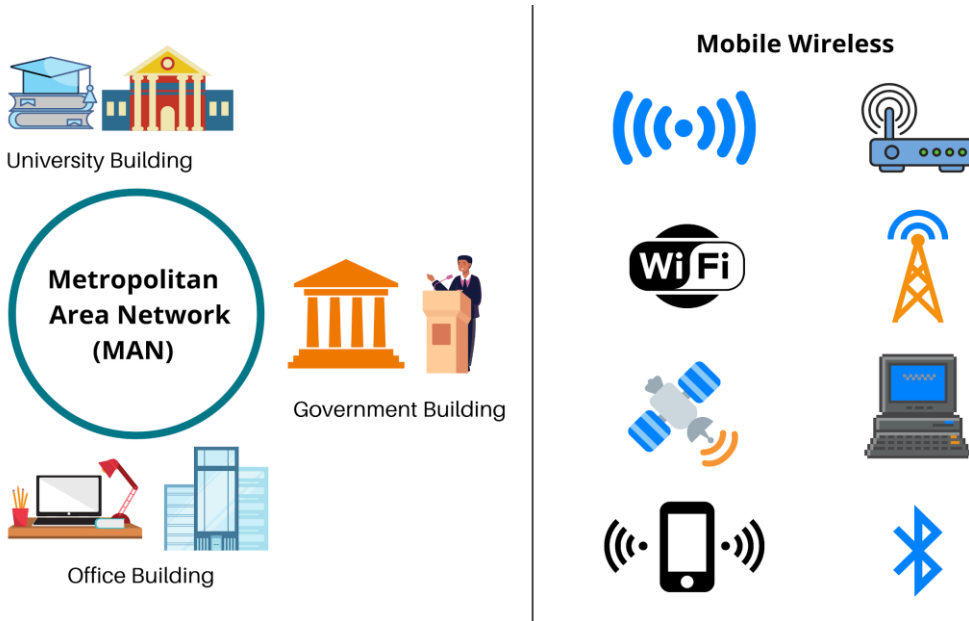


Figure 3. Metropolitan Area Network (MAN) and Mobile Wireless  
 Source: By authors

Such technical advances generate risks related to technology, such as the incompatibility of old and new systems, the lack of technological expertise and too much expectation for technological feasibility [34]. In a smart city sense, interoperability is central to technical progress. A smart city offers interoperable services that allow ubiquitous connectivity, both internally across agencies and externally to people and businesses, to transform government processes. ICT, which is the key resource of the smart city, can be readily incorporated through systems and organisations to enable an organization to adopt a virtual workplace [35].

## 6. Conclusion

In this paper, the impact of smart cities is addressed. We especially study the relationship between smart city, virtual workplace adoption and organizational strategic goals. A model is designed to examine this relationship, showing that smart city resources have led to the acceptance of the virtual workplace, which helps achieve organizational strategic goals. In conclusion, it emerges that a smart city is a polyhedral approach, incorporating ICT, knowledge and environmental protection in order to enhance the quality of life in an urban strategy, with its own priorities, processes and main initiatives [20]. High-technology, not just ICT, is at the core of this strategic perspective, focusing in particular on three interconnected objectives: environmental protection, economic development and quality of life for all.

We expect that the elaborated conceptualization of smart cities in this paper will contribute to future studies. As we explored multiple conceptual dimensions of smart city resources, the concept is an organic connection among technological, human, and institutional components. Nowadays the usage of “smart” captures innovative and transformative changes driven by new technologies. Social factors other than intelligent technology, however, are essential to smart cities. A socio-technical perspective on smart cities is important in this context. A thorough understanding of the dynamics and interconnections between social and technological variables of services and physical environments in a community is needed to lead a smart city initiative. For future research based on a socio-technical view, we must increase the numbers of surveyed employers and/or managers for validity of the result [36].

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