A tale of two cities: Achieving smarter economy through communication and virtual work

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Abstract

Seamless communication within and between cities allows for a tremendous increase in efficiencies, one of which is the way work can be done. When work no longer needs to be carried out only within the confines of the traditional office, it can then be done virtually and this research seeks to explore how communication influences the creation of smart economy through virtual work. Virtual work is increasingly becoming ideal for organizations as there is a rise in the quality and quantity of data that can be accessed and analysed from outside the traditional office. Smart city research has shown that has also shown that for cities to be have smart economies there needs to be seamless connection between points of information within such cities.

This research begins with a detailed desk research to identify and outline the key indices for smart mobility and smart cities, leading to the proposal of a conceptual framework for evaluating two selected case studies through surveys within these cases. This research therefore builds on prior smart cities and virtual work research to establish a framework for evaluating and explaining the relationship between smart communication and smart economy and established the link between connectivity/communication to mobility, and further shows how the increase in connectivity increase virtual work which in turn leads to a smarter economy. The implications for the results from this research extends the ongoing work been done to increase efficiencies in the connection of infrastructure, human capital and information within cities which is useful to both academics and policy makers alike. The clear relationships established between virtual work and smart mobility and its mediating effect on the development of smart economy is very valuable for academic and practice.

Keywords: Smart mobility, Virtual work, Communication, Smart economy.

1. Introduction

In today's world cities are the main centres of economic growth; they are also the centres inhibited by an increasing proportion of population. Cities' participation in the global GDP is currently around 80% (World Economic Forum, 2018). The urban population in 2014 accounted for 54% of the total global population, up from 34% in 1960, and continues to grow (WHO, 2016).

The smart city concept originated from various definitions including those of the 'intelligent city', '**information city**,' 'knowledge city', 'digital city' and 'ubiquitous city'. It also has something in common with such notions as 'creative city', 'green city' and 'clever city'. These different 'brands' of the city concept have a different scope and place different emphases [1], [2], [3], [4]. All of them are used in the context of defining modern cities or the cities of the future, although in principle, none of them captures the essence of the concept of a smart city, and only shows some differentiators, which are also an inherent feature of the city called 'smart'. Thus, the concept of the smart city itself is fuzzy and often inconsistent [5].

A Smart City System comprises of six key building blocks: (i) smart people, (ii) smart city economy, (iii) smart mobility, (iv) smart environment, (v) smart living, and (vi) smart governance. These six building blocks are closely interlinked and contribute to the 'Smart City System' There is a school of thought that seeks to apply system thinking to conceptualizing and operationalizing smart city projects [1], [6]. This leads us to give more prominence to smrt people.

1.1. Smart cities and smart economy

Smart economy fosters innovations and entrepreneurship process. According to Bruneckiene & Sinkiene (2014), "smart economy remains one of the key drivers of the smart city and one of the smart city indicators, because the city, characterized by high economic competitiveness, is assigned to smart cities". Smart economy involves innovation activity and mutual cooperation of enterprises, research institutions and the citizens in order to develop and promote innovation through these networks [7], [3], [4]. Smart economy is a growing and sustainable economy [8]. The interrelationship of smart economy with smart city is also difficult to decipher [9], [4]. It is not clear whether a city is smart because of its smart economy or smart city is the reason behind the working of a smart economy. The first view of city is that it is an urban area that presents itself as a homogeneous entity with a territorial boundary. This homogenous urban character of a human settlement defines it as a city A second view of city is an area with a definite administrative boundary, such as a Town Committee, Cantonment, Municipal Corporation, Municipality or Metropolitan Area defined by government on its discretion.

The other view of city is that of a functional system or urban region that is based on and supported by connectivity and linkages among its constituent parts. For example, the daily interaction, movement of goods and people, telecommunication flows, and transportation connectivity combine to create a functionally connected region.

1.2. Communication in smart cities

The above narrative leads us to visualize a smart city. Here a city is a digitally interconnected system where sensors of different kinds exist for different purposes and goals. They can be electronic devices with definite function to perform in an urban system or even human beings with biological, sociocultural, ecological, and economic goals. These sensors have unlimited capacity to establish functional linkages with outside world for social, cultural, environmental, and economic purposes that may create necessary conditions to enable the flow of communication, goods and services, and monies [9].
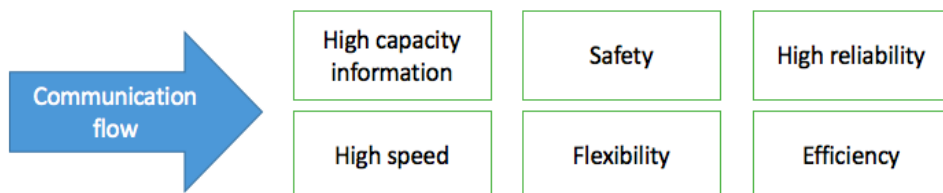

Fig. 1. Communication flow for virtual work.
Source: developed by authors

1.3. Virtual work in smart cities

Compared to their rural counterparts, cities boast better IT infrastructure and higher usage of ICTs and smart digital devices. Thus, cities generate vast amounts of data related to people, economy, infrastructure, culture, environment, urban living, and decision-making. 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.

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 [10], [11]. The key issue is how to lead through influence rather than hierarchy and the ease of communication for the purpose of creating value [10], [11].

2. Evaluating smart cities through smart economy indicators

In order to measure the level of the smartness of cities, the comparative analysis of a major Spain (Barcelona) and Lithuanian city (Vilnius) is done. Smart People, smart economy, smart environment, smart mobility, smart living and smart governance have been identified as building blocks of smart cities [12], [13]. However, the focus of analysis would remain on smart economy component of the identified blocks in a bid to highlight the links between seamless communication [14], [15], virtual work [16], [17], [18] and the smart economy.

The selection of indicators is limited by the availability, quality and the volume of statistical information as shown in the table 1 bellow.

Table 1. Dimensions and indicators for evaluating smart cities

Smart city dimension	Main indicators	Barcelona	Vilnius
Smart People	Level of education, life long learning, formal or vocational training	Level of education, formal or vocational training	Level of education
Smart Economy	GDP per capita, unemployment rate, annual household income, number of hotels and restaurants, proportion of population employed in educational sector, level of computer skills, expenditure on health care	GDP per capita, unemployment rate, annual household income, number of hotels and restaurants	GDP per capita, unemployment rate, level of computer skills, expenditure on health care
Smart Mobility	City logistics, Information mobility, People mobility	Information mobility, People mobility	City logistics, People mobility
Smart Environment	CO_2, Percentage of citizens travelling to work by public transport	CO_2	CO_2
Smart living	Social and digital inclusion, safety, housing conditions, smart buildings	safety, housing conditions, smart buildings	housing conditions, smart buildings
Smart governance	Percentage of household with internet access at home	Percentage of household with internet access at home	Percentage of household with internet access at home

Source: By authors

The argument of Albino, Berardi, & Dangelico, [19] which surgest that proper definition of the smart city is necessary to identify what dymensions are most likely going to give the right indicators for evaluating its performance leads us to identifying the smart economy dimension as the one tangible avenue for evaluating the amart city. The work by Kumar & Dahiya, [4] to expose smart economies in smart cities is extended by identifying the indicators of smart economy that paints and clear picture of the smart city and allows us to carry out a proper comparative analysis as in the case of Barcelina and Vilnius table 2. bellow

Table 2. Evaluating smart city through smart economy indicators

indicators	Barcelona	Vilnius
GDP per capita,	yes	yes
Unemployment rate,	yes	yes
Annual household income,	yes	yes
Number of hotels and restaurants,		
Expenditure on health care	yes	yes
Proportion of population employed in educational sector,	yes	yes
level of computer skills,	yes	yes

Source: perceptions from Eurostat 2019

3. Discussion and conclussions

The case of Barcelona and Vilnius does not provide a good spectrum for comparative analysis based on the theoretical discus in the early part of this paper. Although the indicators identified from literature allows us to evaluate how well highlighted information sources drive communication within the city and between stakeholders and the direct relationship to the way work is done in the smart city, the ultimate relationship and causal influence to smart innovation, logistics, commerce and services is shown in the framework developed and proposed in this paper. Information sources which allows for seamless communication and transfer for data for purpose of work and value creation has been identified to include IoT data source, social media source and city information sources as shown in the theoretical framework below.
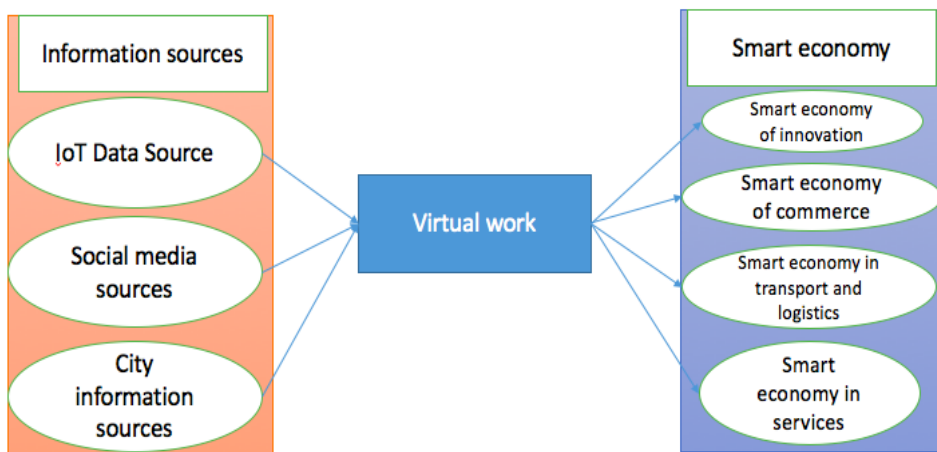

Fig. 1. Smart City Communication, virtual work and smart economy framework. *Source: by the authors*

The result of virtual work using available information streams as illustrated above is smart economy of innovation, smart economy of commerce, smart economy of transport and logistics. And smart economy of service. It would be fair to conclude that many cities claim to be "smart" in a rather self-congratulatory fashion. After all, why would a city call itself something else than a smart one? How a city labels itself is irrelevant for obvious reasons? What matters is how a city continually aims to develop itself to better serve its citizens

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