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Assessment of Economic Benefits of Smart City Initiatives

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Abstract: Smart cities are meant to raise people's living standards. However, The Smart Cities view is nuanced and developing. The city's population expansion must be regulated while maintaining environmental safety. This paper examines the economic benefits of Smart City Initiatives utilising twelve expert interviews as part of qualitative research. The thematic analysis results highlighted the value proposition for Smart City Initiatives to establish a Smart Eco-system. Experts emphasised the tremendous economic benefits, yet institutions struggle to strategies implementation methods. Smart Cities' economic systems must be controlled to protect and enhance estate equitably so that current capital is divided evenly or better among city people. A smart city offers various advantages to businesses, governments, and municipalities. In this way, economic benefits give a competitive edge. However, the perception of Smart Cities is still developing. It is gaining popularity as governments worldwide strive to make cities smarter. The new research should focus on assessing smart city economic gains.

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1. Introduction

The concept of smart cities attempts to alleviate difficulties by producing cutting-edge and inventive techniques for resolving modern life's obstacles and generating results for interdisciplinary urban challenges. Along with the growing number of Smart city programmes being implemented globally, it is necessary to examine their strengths and limitations to identify their future potential for improvement and advancement. Cities are today confronted with enormous challenges, including population growth, congestion, a high rate of new entrants, resource consumption, a scarcity of sufficient tangible and community infrastructure, long-term prosperity, and stricter efficiency and ecological limits (Chourabi et al., 2012; Institution, 2014). Urban areas, according to the United Nations (2021), have a higher population density than rural areas. In 1950, 30% of the total population lived in cities; by 2018, that percentage had climbed to 55%. In 1950, just 30% of the world's population lived in cities; by 2018, that proportion had increased to 55%. By 2030, it is expected to reach almost 60%, and by 2050, it is expected to reach approximately 68 per cent of the global population (Nations, 2021). The rise of metropolitan cities is being fuelled by the growth of the overall population and a shift in the percentage of people who live in urban areas. These two factors are predicted to add almost 2.5 billion people to the world's urban population by 2050, with Asia and Africa accounting for about 90% of that growth. 512 metropolitan cities with a population of at least one million people and 31 central cities with a population of more than ten million people were detected worldwide in 2016. Cities are predicted to provide 80% of economic development. Around the world, over seven out of ten people live in metropolitan areas, which cover 3% of land and generate 72% of global greenhouse gas emissions (Bank, 2020; Commission, 2020).

Continuous population growth, particularly in metropolitan areas, creates a slew of concerns for city planning and extraordinary sustainability challenges, both environmental and infrastructure-related (Akande et al., 2019). Numerous interdisciplinary disciplines of study have been devoted to urban development challenges. Nowadays, cities are composed of more complex systems that are continually growing, prompting a collaboration between several research fields to address the escalating difficulties (Israilidis et al., 2021; Mora et al., 2019; Sharifi, 2019). To achieve the 11th Sustainable Development Goal of creating towns and communities that are extra secure, sustainable, adaptive, and inclusive, it is vital to understand the significant trends that will determine the future of urbanisation (Nations, 2021). As a result, evaluating city growth development and implementation plans to meet multidimensional human and sustainability needs is difficult. "The Intelligent City" "idea directs the issues mentioned above by identifying cutting-edge and innovative approaches for managing the complexities of metropolitan life in terms of implementing solutions for comprehensive multidisciplinary problems such as energy consumption, environmental monitoring, the standard of living, resource management, security, metropolitan operational efficiency, and service availability (Bibri et al., 2017; Sharifi, 2019). Despite the abundance of research avenues and the lack of a commonly accepted description for the rapidly increasing Smart City concept, it is apparent that analysing the impact of Smart City deployments is vital and requires scholarly literature.

There are many possible theories for smart cities, none universally accepted (Wall et al., 2016). The proliferation of Smart city models, standards, and definitions has produced uncertainty, making it difficult to determine whether Smart cities are aligned with their proponents' initial goals and principles (Grossi et al., 2017). Numerous recent studies have raised concerns about existing smart city initiatives (Patrão et al., 2020; Shamsuzzoha et al., 2021; Taamallah, 2017). As a result, the critical issue is connected to delivering the value anticipated by individuals and, more broadly, all engaged stakeholders. Additionally, academic studies continue to focus on definitions and domains associated with the concept of digital cities without taking into account its evolution paths based on economic benefits, which are becoming increasingly important (Komninos et al., 2018; Patrão et al., 2020; Wirsbinna, 2021).

Within the framework of European countries, the European Union (EU) has worked relentlessly to devise a strategy for achieving smart urban expansion in its metropolitan districts (Caragliu et al., 2013). Other international organisations, think tanks, and the European Union believe in a connected, ICT-driven growth model. Active deregulation and privatisation have occurred as part of the European Innovation Partnership for Smart Cities and Communities (EIP-SCC), with neoliberal governance assemblages capable of emerging and moving rapidly across diverse cities throughout Europe. At a variety of scales (Cardullo et al., 2019) The EIPSCC is a European Commission initiative that was launched in 2011 with the goal of "bringing cities, industry, SMEs, banks, research, and other smart city actors together". It "accelerated the development of smart technologies in cities," and "improved citizens' quality of life" through a focus on "at the nexus of energy, information, and communication Debnath et al. (2014).

The purpose of this research is to ascertain whether smart city development technologies contribute to city sustainability; whether cities are becoming easier to plan and govern as a result of such innovation; whether contemporary technology simplifies or complicates smart city development; and whether inhabitants perceive smart cities as more liveable and appealing places to live and work.

To fill up the gaps in the study, this essay will focus on the economic benefits of Smart City efforts. Additionally, this research seeks to collect results for the following research areas on Smart cities: "what economic benefits may a Smart City give in the future" and "what variables promote and obstruct Smart city activities aimed at gaining economic benefits in the near and distant future."

2. Literature Review

2.1 Definition of Smart cities

The concept of smart cities arose in the late 1990s, based on the premise that systems supporting urban residents should be integrated. It was founded to strengthen the bond between people and cities (Pinochet et al., 2019). Although scholars have presented a variety of definitions for smart cities, they all agree on the importance of using technology and information to connect people, produce intelligent buildings, and improve transportation systems (Yadav et al., 2019). However, there is no consensus on what constitutes a digital city, and the concept of smart cities is not universally acknowledged (Pinochet et al., 2019; Wall et al., 2016). The profusion of Smart city models, standards, and definitions has generated uncertainty, making it difficult to determine whether Smart cities are aligned with their proponents' initial goals and values (Grossi et al., 2017). As a result, several recent studies have expressed concerns about existing Smart city programmes. However, the primary objective is to generate the economic value anticipated by individuals and, more broadly, by the parties involved. The term "Smart City" is a cross-disciplinary concept with numerous interpretations based on where and how "digital" is employed (Cocchia, 2014). According to the European Commission (2020), a smart city is "a place where traditional networks and services are optimised via the use of smart and telecommunication

technology, to the advantage of its residents and businesses." The following table 1 summarises several broad definitions proposed by academics, practitioners, and policy-level organisations.

Table 1. Definition of Smart Cities

Definition	Sources
Smart cities take a system-oriented perspective to the clever usage of ICT through an interchangeable architecture to deliver enhanced and advanced facilities to their inhabitants, affecting life quality and natural resource management.	(Ismagilova et al., 2019)
Smart cities are defined as strategic efforts that provide "green" solutions to improve economically-friendly, societal and productive circumstances while also upgrading towns' charm and economic productivity.	(de Jong et al., 2015)
Smart cities are gaining attraction as a concept that symbolises a latest stream of ""techno-optimism"" and stresses the beneficial impacts of ICT and other emerging techniques, typically in conjunction with diverse collaborations.	Understanding smart cities: An integrative framework.
Smart City's growth considers every aspect of diversity, particularly the atmosphere, the economy, and people's welfare.	(Cocchia, 2014)
Smart cities should contain unified metropolitan ICT that can cover a town and enable the transportation of linked metropolitan facilities while also allowing for effective global administration of such facilities.	(Cisco, 2014)
A Smart City is a technically sophisticated and updated are and updated area besides the conceptual capability to cope with different societal, productive and elements of technological advancement using Smart evaluating methods to build better framework and facilities.	(Bakıcı et al., 2013)
Sustainable transportation, energy consumption, and ICT system development are all based on the growth of Smart City.	(Chourabi et al., 2012)
The term "Smart City" implies a town that is instrumented, networked, and intelligent. The capacity to capture and integrate current physical world information via detectors, measures, devices along with individual gadgets is referred to as "instrumented".	(Harrison et al., 2012)

2.2 Smart City Initiatives and Progression

Since its outbreak in late 2019, the COVID-19 pandemic has spread to multiple cities globally, killing millions of people and causing devastation to the economy. The epidemic occurred at a pivotal historical point, as smart solutions and technology became commonplace in many cities. Automation must be considered as a tool for attaining the objectives of a Smart City implementation based on the area's business, individual, environmental, and administrative demands (Mora et al., 2019). Smart cities leverage knowledge and interactive technology to boost individual well-being, service quality, environmental sustainability, and economic progress. Smart City projects contribute to infrastructure improvement, system digitisation, service integration, platform automation, safety, stakeholder recruitment, and meeting citizen expectations. According to Navigant Research's global market analysis, more than 250 smart city projects were implemented in 178 cities worldwide in 2017. (Research, 2017). According to the 2018 IESE Cities in Motion Index, Europe is the most successful natural area, with 12 cities ranking among the top 25 smart cities (IESE, 2018). By 2021, Europe expects to develop more than 300 smart cities. Numerous Smart City concepts and architectures have evolved over the last several decades, but all view the city as a collection of interconnected components, including mobility, living, people, economy, and environment (Samih, 2019; Sharifi, 2019). Due to the diversity of components and associated aspects, the Smart City efforts have attracted multidisciplinary approaches and study areas (Patrão et al., 2020; Shamsuzzoha et al., 2021). In light of these discoveries, there is growing interest in widening the scope of the Smart City debate to incorporate interconnection and other socio-technical perspectives (Visvizi et al., 2018). Table 2 illustrates the many forms of infrastructure found in the Smart City, along with their associated meanings. This new role for towns as resource hubs and information repositories is crucial for urban sustainability and standard of living enhancement (Kumar et al., 2020). On the other side, Smart City efforts fade away after the trial phase, and the lessons learned from previous programmes are never scaled up to impact future implementations (van Winden et al., 2017). Additionally, in response to a recent call for the inclusion of diverse perspectives in Smart City publications (Lytras et al., 2018), it is critical to understand the economic benefits of Smart Cities.

Table 2. Infrastructure Types in Smart City and Definitions

Infrastructure Types	Description	Sources
Institutional	Institutional infrastructure encompassed Smart City governance, which included creating political strategies, governance accountability, and public participation in decision-making.	(Mohanty et al., 2016)
Physical	The physical infrastructure's major objective is to secure the Smart 'City's long-term viability in the near and distant future. Natural deposits and power, ICT architecture, structure and metropolitan design are considered part of the physical infrastructure.	(Silva et al., 2018)
Social	The intellectual and human capital and the quality of life are all covered by social infrastructure. The growth and viability of the Smart City are regarded as dependent on social infrastructure and social awareness.	(Ismagilova et al., 2019)
Economic	The Smart 'City's economic infrastructure includes everything from e-commerce and e-business to different performance metrics for analysing public spending, employment rates, energy consumption, Smart City project financing, and count of individual GDP.	(Haughton et al., 2008)

2.3 Goals of Smart City Initiatives

Social, environmental, and economic sustainability are the most prevalent and critical goals of Smart City Initiatives. Social sustainability is a vital factor to consider when planning future urban development. This subject was investigated to ascertain whether there might be adverse environmental implications (Monfaredzadeh et al., 2015). Individuals and communities living in smart cities are concerned with societal diversity. In a Smart City, societal sustainability is directly related to effective community engagement strategies and positively affects social structure. Although there is a close correlation between societal sustainability and the concept of the Smart City, it has gotten less attention than environmental sustainability (Bouzguenda et al., 2019; Yigitcanlar et al.,

2019). Globally, the sustainability of the atmosphere is regarded as one of the most severe issues.

The essential purpose of this concept is to maintain a healthy ecosystem at a reasonable cost by conserving scarce resources and reducing CO2 emissions, which contributes to preventing or mitigating environmental degradation. Environmental sustainability is a significant issue for the growing trend of smart cities, as cities have immense potential for sustainability (Chatfield et al., 2016). Municipalities are responsible for environmental damage for various reasons, including adaptation, energy and water use, and rubbish generation (Brauer et al., 2015). Economic stability is necessary for long-term individual growth in the Smart City area. It's also a matter of balancing generational gaps, which is not always as simple as we imagine. This is the connection between distributional equality, sustainable growth, optimal development, and time priority (Anand et al., 2000). Economic systems in a Smart City must be managed so that available money is distributed evenly or more efficiently among town people to create and expand resources equitably or more efficiently. As a result, economic sustainability would present opportunities to increase individual output in the future. This strategy will be considered a collection of economic and social aspects that contribute to the advancement of knowledge and competence among Smart city residents. The Smart City analysis aims to develop and implement associated analysis and growth in smart cities and the long-term evolution of the living environment. Smart City solutions enhance daily life functionality in various ways by facilitating item control, conversational interaction, and accommodating linked campaigns. A Smart City's central concept is to integrate intelligence into every aspect of the ecosystem in which people live and interact, including smart infrastructure, smart transportation, smart governance, smart education, smart agriculture, smart health care, smart industry, smart energy, smart environment, and smart economy (Brauer et al., 2015).

2.4 Research Gaps

The "smart city" concept has gained enormous popularity in policy circles in recent years. While extensive research has been undertaken on the importance of human capital/education, environmental concern, and social and relational capital as fundamental drivers of urban expansion, it appears that the primary focus is on the role of ICT infrastructure (Caragliu et al., 2013). Although this is still a work in progress, the groundwork has begun. It begins with the concept of an Urban System (Sanders, 2019; Yang, 2020), which can be regarded as a catch-all term for any of the numerous sorts of systems networks. These Urban Systems may be simple or complex entities composed of more straightforward elements. The Urban Information Model is a technique for organising and categorising the diverse types of data stored or sent across these networks. From an information technology perspective, the Urban Information Model can be thought of as a massive collection of layers reflecting a common two-dimensional space, the territory of the urban environment, whether it is a single city or a metropolis.

According to Israilidis et al. (2021), only six empirical studies (or 7% of all studies) included data from two or more countries. The majority took place within a single country, and they dominated Europe's attention to industrialised countries (5 percent). Most studies (31%) were followed by those conducted in Italy (21 percent). Apart from the United Kingdom, Asian nations (20%) have garnered the most focus in smart city research, particularly in China and India. Research is conducted in the United States (10 percent). It's worth noting that none of the studies included in our selection was specifically focused on Africa, and as Ismagilova et al. (2019) note, additional comparative studies with a cross-cultural focus are necessary. As a result, we still know very little about smart city programmes in many parts of the world. Cledou et al. (2018) propose a taxonomy for planning and developing smart mobility projects. While these studies provide valuable insights, there is a need for smarter city research to foster theoretical breakthroughs based on bigger, multi-country perspectives. Additionally, such research is expected to pave the way for fundamental scientific and social scientific investigation in smart city research, facilitating effective learning and knowledge management. In light of the research gaps in the field of smart cities, this study conducted a qualitative exploratory study to address the gaps in knowledge regarding the economic benefits of smart city efforts.

3. Methodology

Given the research objective of determining the economic benefits of smart city programmes, qualitative exploratory research is an acceptable selection method. There is no pattern for defining a smart city, and no example of a smart city exemplifies the attributes. As a result, the majority of often mentioned examples involve cities seeking to become smarter by incorporating IoT interventions into their smart city visioning (Snow et al., 2016). Luque-Ayala et al., (2019) stated in a detailed piece that urban-based entrepreneurship is a developing field that necessitates nuanced knowledge gained through an exploratory research method. Kitchin (2014) did a qualitative study with interviews to highlight the importance of researching smart city development. The numerous strategies used to implement the smart urbanism agenda in cities around the global South are poorly known (Luque-Ayala et al., 2019). Because smart cities are relatively unexplored, qualitative exploratory research is more appropriate. This study employed semi-structured interviews to make broad generalisations about a larger group of people based on their issues and relevance (Dworkin, 2012). To combat elitist bias, candidates were chosen from among individuals referred to as "urban development professionals" who provided services to Smart City projects worldwide.

3.1 Data collection

Individual interviews with specialists with five years or more of experience were conducted to ascertain their skill set and intellectual capacities for Smart City Initiatives. Purposive sampling was used to recruit research subjects. Between November 2020 and March 2021, twelve specialists were interviewed in European nations.

Candidates were interviewed in private venues to ensure their privacy and confidentiality. To ensure participant safety and adhere to social distancing procedures in the aftermath of the Covid-19 outbreak, most interviews were conducted virtually. The conversation began with a brief introduction to the investigator and explaining the article's purpose. The interview format is divided into three sections:

1. A brief introduction

2. A form of consent

3. A collection of open-ended questions

The participants volunteered; each conversation was audiotaped with their approval and kept private by assigning each one a code. A variety of semi-structured questions were utilised to elicit responses from each set of respondents. All of the respondents' questions focused on developing a better understanding of the city's context for adopting smart technology to boost efficiency and the role of the local environment in supporting smart cities. The Smart City Initiatives and their significant economic impact were the focus

of interview questions such as "where do you see the benefits of Smart City Initiatives?" "in which fields do you see the greatest economic benefits?" and "what does an economic advantage mean in Smart City Initiatives?" Additional probing techniques were used to associate the economic value of Smart City initiatives with cost savings, efficiency, risk mitigation, quality of life, and infrastructural improvements. Each interview lasted an average of 35 minutes. Following that, the researcher collated and transcribed interview notes. A summary was written prior to beginning the transcription processes. The majority of the transcriptions were in German. Thus, the researcher assumed responsibility for translating into English for analysis with the assistance of Google Translate. MaxQDA software was used to conduct thematic analysis.

4. Analysis

We studied and analysed written notes and transcripts using a content analysis approach and the MaxQDA programme to identify categories and themes. Content analysis is a frequently used technique in qualitative research approaches (Drisko, 2016; Rädiker et al., 2019). Textual analysis is a technique for systematically examining content and discovering recurrent themes. This approach examines the significance of nonverbal communication, auditory information, and visible information (Harper, 2011). The researchers used both manual and text analytic methods to identify coded messages, sub-categories, categories, and themes in their study. The most frequently occurring terms in the text were discovered using a word cloud technique (DePaolo et al., 2014). To identify phrases and repeated words associated with the questions, the interview data were analysed thematically using the MaxQDA method (Rädiker et al., 2019). Thematic analysis consisted of the following steps: first, acquaint yourself with the material by reading and rereading transcripts; second, categorise and code; and third, identify themes; fourth, descriptive links; and fifth, conceptualise "how what, and why." Smart City initiatives benefit the economy. The data analysis results gave valuable insights and recommendations for Smart City efforts to sustain and scale up urban development. Table 3 summarises the characteristics of the study participants. Table 4 summarises the themes and categories that emerged from an assessment of expert viewpoints on Smart City efforts with an eye toward economic benefits. Categories and topics provide additional context for the use of verbatim responses from applicants by defining codes such as Interviewee-1, Interviewee-2, and Interviewee-3 for expert-1, -2, and 3 respectively.

Table 3. Study Participants Characteristics

Codes	Gender	Current Job title/position	Experience in years	Professional Engagement
Interviewee-1	Male	Senior Manager Smart cities & Smart Transformation	10	Consultant
Interviewee-2	Male	Policy Officer General Affairs	5	Consultant
Interviewee-3	Male	Program Manager	10	Government Office
Interviewee-4	Female	Executive Director	10	Government Office
Interviewee-5	Female	Project Manager	10	Government Office
Interviewee-6	Female	Director Digital	5	Government Office
Interviewee-7	Female	Head of Smart Cities	5	Government Office
Interviewee-8	Male	Hub Manager Greentech	10	Government Office
Interviewee-9	Male	Head of the Smart Model Region	10	Government Office
Interviewee-10	Female	Head of Smart cities & Solutions	5	Industry
Interviewee-11	Male	Professor of Business Consulting and Management, Senior Advisor	10	Consulting
Interviewee-12	Male	Innovation Project Manager	5	Consulting

5. Findings

According to this study's conclusions, there is a significant need for government and institutional support for Smart City projects. The benefits of smart cities are summarised in Table 4 by code, category, major category, and theme. The investigation established that the cutting-edge technological advancements that define Smart cities demand significant financial investments by the city, region, or country. Considering all the investments, are Smart City efforts a waste of money if they fail to provide tangible results? With the economy functioning as it does, technological breakthroughs or benefits to inhabitants may not be sufficient to justify the advancement of Smart cities if they come at a considerable financial cost. Fortunately, a successful Smart City deployment entails a host of economic benefits. According to Anand et al. (2000), the researcher can then determine whether smart city efforts affect the quality of life, environmental performance, efficiency, competitiveness, and other critical features of smart sustainable cities. This type of review would be impossible to implement because smart city efforts are still in their infancy. Kummitha et al. (2019) emphasised the smart city's technology component. Thus, businesses might spearhead urban development projects. According to Anand et al. (2000), smart city assessment can give crucial performance indicators for evaluating several advantages for various actors and stakeholders, including municipal governments, investors and funding agencies, academics, and the general public. The economic benefits of smart city initiatives are summarised in Table 4, based on thematic analysis of expert interviews.

5.1 Cost Savings

Smart cities may utilise these Smart technologies and services to bring their diverse networks together and save money. Indeed, cost savings are linked to the efficiency potential of the Smart City Initiatives. Smart City Initiatives address revenue potential in commercials and associations by lowering costs.

""Aside from the [other] effect, I want to discuss cost savings … So, I want the most innovative projects right now, which are Smart City technologies that start with saving"" (Interviewee-9).

Hence, it is long-term investment in terms of building Smart infrastructure. There are multiple ways to save the cost, such as efficient transportation system, water and energy supply, less maintenance of public facilities, etc.

""Digitalisation and Smart measures can save money and increase efficiency… [Another] perspective of municipal utilities is revenue generation, i.e., sales in new business areas to get advantage of cost saving from facilities maintenance"" (Interviewee-12).

It is essential that city commissioners manage the system efficiently to facilitate citizens as per their needs and wants. However, it is important that long-term saving requires an initial investment.

""In our parallelism of analogue and Smart processes, we always say that before saving anything, we first need more money and more staff … and we must first implement before we can begin saving"" (Interviewee-3)

Table 4. Theme, main categories, and sub-categories illustrating economic benefits of Smart City Initiatives

Theme	Categories	Codes
Economic benefits of Smart City Initiatives	Cost savings	Reduce cost of services Minimise cost of maintenance of facilities
	Efficiency	Mobility of citizens Easy access to services
	Security	Control of traffic in rush hours Mobilise people in case of pandemic Emergency response services
	City Attractiveness	City scenery Attraction points for the tourists Increase likelihood
	Connectivity	Application of internet of things Connect multiple stakeholders Faster communication and deliverance
	Sustainability	Take advantage of facilities in the long term Generate mutual benefits for all stakeholders
	Smart Transportation	Connect multiple spots for traveling Preference for public transport instead of private
	Smart building	Provide additional facilities to citizen at single place Managing resources such as water, energy efficiently
	Funding	Plan for funding to take advantage Funds allocation from government institutions
	Measurability of Smart City Initiatives	Monitoring of Smart City initiatives Impact evaluation of Smart City Initiatives

5.2 Efficiency

The value of efficiency is viewed differently for Smart City initiatives as this is a critical component. The efficiency can be seen in manufacturing, energy consumption, urban farming, and other processes that may all benefit from Smart City technologies.

""We have a Smart waste collection in Rotterdam. It shows that we are currently 20-25 percent more efficient in our waste management. They also have sensors in their waste bins to collect waste intelligently. So, they're working on a Smart City"" (Interviewee-5).

Although the focus is on digitalisation rather than efficiency, one expects to acquire a competitive edge in the long run. Hence, efficiency is linked with digitalisation. More the system connected with the information technology will faster the services and ensure the connection with stakeholders.

""Savings will only be possible if significant investments are made in IT and a high degree of digitisation prevails at these points to ensure efficiency. That means at every point … it should be questioned whether the effort put into digitisation and IT expansion also pays off in terms of process and resource savings"" (Interviewee-11).

In addition, Smart City initiatives ensure efficiency concerning citizen mobility and convenient facilities. The capacity to evaluate, measure, and compare all data is intended to improve service delivery efficiency. As a result, it restructured and consolidated its service to increase citizen experience and efficiency.

""The target is to have more efficient, more economical design operation maintenance over the lifecycle"" (Interviewee-10).

5.3 Security

Large city control centres are essential to provide security to people. These control centres provide data on traffic flows, people, and sensors, such as water levels in flood zones. Security covered from multiple perspectives such as preparation for emergency response, traffic management in rush hours, mobilisation in case of disaster or pandemic, etc. The avoidance of risks and damages is at the top priority. Smart City initiatives could help and handle it well, especially in the pandemic where the rapid response is needed.

""The topic of public safety is always on consideration. I believe that Smart City concepts are more likely to create security gaps. You may recall the Treptow-Köpenick [Berlin district] power outage from a year and a half ago when an entire district went without electricity for several days, hence security is always needed"" (Interviewee-7).

""I think that's a big issue [security] because the states tend to have that right. If they [government] think it's good for us, we see a tendency to use it for other things. That's probably because, during the pandemic in Spain, they asked Telefonica [a Telecommunications company] to know if people were staying home or moving around"" (Interviewee-6).

Hence, Smart City initiatives could bring an efficient system to provide security to citizens using multiple resources.

""It probably needs to be more specific, so I believe we're seeing more attention on resilience in cities—if Smart cities can help mitigate the outbreak of unexpected obstacles, infections, and so on"" (Interviewee-10).

""That I take for granted. For example, by recording their movements with sensors, you can see how many people are [present] and moving in a certain section of the street, say during an old town festival. And before sensor technology, cities have always appreciated this or put someone with a click clock. Using sensors, you can get a precise picture and redirect

motion currents accordingly. So, if an old town ugly is clogged there, it could be a crime. If you have accurate data, you can do so. How many people have been in it and just redirected? If this happens in parallel, you can achieve strong effects here [in terms of security"]" (Interviewee-12).

5.4 City Attractiveness

Smart people want to reside in Smart Cities. That is justified because talent is attracted to attractive cities and is willing to relocate if large employers see high demand. Smart City Initiatives can help the city's 'on boarding' process by simplifying many administrative requirements. Smart City Initiatives focus on upgrading residents' standard of living.

""*The people's needs are at the heart of all market discussions. What an interesting change in the way Smart City projects were initiated. I believe that the added value of the Smart City is precisely how to address inequalities and use technology and the Smart City concept to improve people's lives*"" (Interviewee-6).

People's quality of life is more important than technology. As for the city promises increased tax revenue, an ample supply of qualified workers, and a better image.

""*As a tenant, we notice that synergies can be leveraged through networking, sector, or cross-departmental work. That's a lot. Administration far too little used, perhaps more laborious in the beginning. But in a constantly condensing city, it is important to enabling multiple uses*"" (Inteviewee-4).

The COVID-19 pandemic has shown that Smart infrastructure can significantly impact a city's attractiveness. A fast internet connection can make a city, region, or sub-region more appealing and economically viable, as businesses can be run from home.

""*Doubtful if it's decisive. Nevertheless, I believe it can be a location factor because a Smart City if it also pursues the goal of [being] a more liveable city, is an attractive location factor, as we can see in Berlin right now. Yes, multi-modal traffic. So that I can quickly integrate into city life as a newcomer, it is easy for me to quickly become a citizen, and there is a high expectation from outside, but Berlin also has a lot to do. So far, so good, but not due to previous Smart City measures. […] It works well as a location factor, so the city isn't primarily about technology. Smart cities like Santander or Songdo have the quality of life, and I would doubt it, without ever having been there*"" (Interviewee-4).

""*Absolutely. It starts with banalities and now it's part of the pandemic. So, people want a good internet connection. This isn't trivial. So, to develop rural economies, you often need to first lay fibre optic cables. This is a requirement for a Smart City or village. Also, certain aspects will undoubtedly play a different role in the future than they do now [...]. The majority are in the home office. That's why now many companies will notice, especially those that are very process-oriented and have less innovation or creativity in their company. All the lone fighters on the road who live less from the exchange than from doing certain things [...] so, by offering less office space, you can save a lot of money. This allows people to work from home. There will be a need for co-working spaces, even in smaller towns. This happens frequently in towns of 10,000 or 20,000 residents. I like this business model. The first coworking spaces appeared in 600,000-plus-population cities and Berlin. The word probably didn't exist at the time*"" (Interviwee-8).

""*There is an attraction, especially for the affine, but I believe the attraction goes far beyond that*"" (Interviewee-2).

""*I wholeheartedly agree. For example, Ingolstadt [city in Germany]. For many years, a large car manufacturer financed initiatives to make the city more attractive. It is a Smart City in the sense that it simplifies people's everyday lives and allows them to participate more in the city's life. So, I think the Smart City component can also help here*"" (Interviewee-12).

5.5 Connectivity

Connectivity is the key to success in Smart City initiatives. Internet of things (IoT) applications were repeatedly mentioned with their greater significance.

""*Of course, Smart networks [are important]. That is why we require high-speed networks to get connected with things we need in routine life*"" (Interviewee-3).

This is about LoRaWan technology, open platforms, and big data. Providing open data to city residents or developing commercial business models appeared most important aspect of the Smart City initiatives. This is a new beginning from the perspective of city officials. The stated goal is not to hand over city data to private providers but to use it themselves. But there are often no concrete ideas of how to use this data. The degree of inter-city networking is seen as an economic benefit.

""*I believe that big data and its smartness will not only change but also can develop the system because data can truly improve existing services and develop new services. We as responsible citizens are responsible for making sure that the data is safe and make sure that 'anyone's personal information is never given out*"" (Interviewee-7).

5.6 Sustainability

The evaluation of the European Union Lighthouse Projects shows that sustainability is a priority. Smart City initiatives focus on lowering CO2 and energy consumption (Wirsbinna, 2021b). But they stressed that it is about resiliency.

""*I believe technology should be used to help solve problems and ensure sustainability. Changing things is the only solution. [For instance] Climate change will not be addressed solely by technology so other measure should be taken*"" (Interviewee-6).

""*Sustainability will transform more and more into resiliency. I think as a new common understanding of where you need to go in the future or how you call it is needed*"" (Interviewee-5).

City managers see influence over municipal subsidiaries like housing, infrastructure, and energy supply companies, a sustainability approach to general interests.

""*It's about improving citizens' quality of life, business environment, and reducing environmental impact while addressing the growing concern for sustainability*"" (Interviewww-10).

Smart City initiatives can help make these systems smarter, generating economic benefits for a longer time.

""*From an urban perspective, sustainability is also very important in most cities. After all, I work with [on issues] what you have [in terms of] personnel, energy, or the city itself, to deal with urban infrastructure*"" (Interviewee-4).

5.7 Smart Transportation

In terms of Smart City initiatives in Smart transportation, the public sector heavily considers autonomous driving to reduce costs and traffic congestion. Local and long-distance public transportation must be prioritised to minimise traffic-related costs.

""So collective vehicle ownership [...] Of course, this is far more user-friendly and has, in my opinion, greatly reduced the inhibition threshold. People can now book the car they want very quickly and easily via their app. You can see how much it costs, where it stands, etc. To make such alternative transportation offers, I say, suitable for the masses. The transition from one traffic trip to the next is a big topic here, where digitalisation plays a big role"" (Interiewee-3).

However, city residents will only accept this if it is as convenient or cheaper as private transport. Smart solutions via apps optimise traffic flow or connect to the so-called 'last mile.' Different apps optimise traffic routes.

""The digitisation of the sector and mobility is an area where we are doing it both in terms of rail, road, and waterway[s]. I'm excluding aviation because it's not relevant to the number of trips now 1.5 percent, before the pandemic. For forty years, there have been insane omissions, both in terms of vehicles, investment, and infrastructure. So, if we can do that, the Ruhr area rail lines in Germany will be equipped to the current state of the art"" (Interviewee-8).

""Smartness means they know where they are driving and they know each other. So, it's there. But, of course, the economic benefit is [achieved"]" (Interviewee-7).

5.8 Smart Building

Smart building is an essential component of Smart City initiatives. In the building section, Smart City initiatives were mainly about energy-efficient measures. Lighthouse projects explain how EU funds are being used to renovate old buildings and create positive energy districts.

""But the other thing is the data processing of Smart homes which I believe will increase dramatically in the coming decades. Particularly in security technology, I believe it will regionalise"" (interviwee-2)

""That's a win-win situation. When I consider the building stock, i.e., energy-efficient renovation, there is room for savings"" (Interviewee-4).

This necessitates renewable energies, intelligent building insulation, and networking. This context includes virtual power plants, PV technologies, and Smart meter networking. Indeed, it helps citizens to get all the facilities at a single place.

""We have a demand response for both heat and electricity, which is how we can save Euros. If you have that in use, you can choose to use a bit when you buy or use the heat or electricity and you can set the price that you need"" (Interviewee-7).

""Affordable housing, which is made so technologically fit with housing subsidies, which is also made so technologically fit to the highest possible extent as it is financially possible, that it can also become part of the swarm of power plants"" (Interviwee-3).

""If I build in the new construction sector, for example, with strong energy efficiency, it would be an economic advantage for the operation of the building over time, and ecological advantage, because I have lower energy consumption and thus also focus on environmental aspects, However, the third category of human wellbeing is perhaps called an indoor climate or a building climate for the people who live in it"" (Interviewee-11).

6. Funding

As extracted from expert interviews, bureaucratic obstacles hinder funding, even though funds are currently available. But this requires special knowledge of how to acquire these means of demand, and these subsidies are still needed to fund Smart City Initiatives.

""There is money available for various fields of action. It is then up to the municipalities to use the money. The odds can be difficult"" (Interviwee-3).

Smart City programs usually have too short a development period, and transformations take longer than four years, while infrastructure changes take 10-20 years.

""I believe Europe creates large funds, which should suffice. What I find difficult in Europe, especially Horizon 2020, is that we have participated numerous times [...] but [...] Not necessarily the initiatives themselves, but rather the underlying infrastructure, which takes a long time to develop. So, it's not something you can change into years or four years. It's a long-term transition"" (Intervieww-5).

""There's a lot of money, but I don't think the focus is clear. So, what kind of society will we build when we spend all that money? So, what kind of changes are we making? That is because, again, the lack of knowledge and that is in public sector organisations makes it very difficult to make wise decisions on what lines to follow"" (Interviewee-6).

6.1 Measurability of Smart City Initiatives

Regarding the measurability of Smart City initiatives, diverse opinions are extracted by experts as measurability is generally considered difficult. Officials argued for a 'proof policy' based on the received subsidies. The funding guidelines already have monitoring systems. The EU has set requirements, mainly through the Smart City Lighthouse projects. Hence, they are often described as complex and useless. As stated in the EU Lighthouse project chapter, this usually refers to CO2 reductions or energy savings.

""Measurability a challenge. When we talk about the underlying infrastructure, it's difficult to determine what the real economic value is because all we can say is that applications can do things smarter, effectively, and efficiently, but [...] Creating a unique economic value is difficult, especially when you consider that municipalities are looking for ways to protect the public and societal values"" (Interviewee-5).

""There is always a very precise billing of what EU funding has brought. So, I had to specify in the application what savings we hope to achieve, such as, with this swarm of power plants. When you have these Lighthouse projects, which are now possibly different from us, who have only been there for over a year. The first generation [...] If you look at the indicators, you'll see that I had to settle many projects. So, I believe there are many hints on the cancel ability of Smart City projects"" (Interviewee-3).

The experts also emphasised that these are long-term investments because they are infrastructure projects. The experts were unfamiliar with the many index variations or ISO regulations. The expert-level commercials repeatedly mentioned the published ranking systems for cities. Germany uses the BITKOM Index. Experts did not mention a standardised KPI system. An expert from the commercials group reported that a 'zero' measurement is always made at the start of an initiative. Another measurement is always made after it is implemented. This allows for tracking and measuring a measure's progress (or failure). The main point is that performance measurement is not a priority during the current phase of Smart City Initiatives. The implementation, as well as provision of financial resources, appear to be necessary.

""I don't know of any index. But we have analogies like sustainability indices. There is also an analogy in medical technology, where there are readiness indices, where certain

indicators can be defined in advance and also in their composition. Can measure progress level? I can see something similar for Smart City to gauge progress"" (Interviwee-11).

7. Discussion

Because each city's organisational structure and financial resources are unique, smart city initiatives appear to have a range of outcomes. Certain cities, particularly in the administrative sector, rely heavily on digitalisation and networking. Other cities place a higher premium on sustainability or improving a city's aesthetics. Due to the scarcity of assessment tools, it is difficult to estimate the economic benefits of Smart City initiatives. The findings suggested that smart cities provide numerous benefits to businesses and government regarding cost savings, efficiency, security, attractiveness, connection, sustainability, smart transportation, smart buildings, measurability, and funding. Cities face a variety of challenges as the global population increases, and more people move to metropolitan areas, necessitating innovative and creative solutions. Smart City implementations can help cities overcome the limits associated with traditional urban development models, hence boosting their sustainability and resilience (Patro et al., 2020).

As a result, economic benefits provide a competitive advantage. Cities face numerous challenges as the global population increases and the transition to urban living conditions happens, demanding the development of new and smart solutions (Nations, 2021). Smart City implementations can help cities overcome the constraints imposed by traditional urban growth models, increasing their ecological sustainability. Even if there is no single explanation for the Smart City theory, all current definitions share one goal: they all want to improve the quality of life in cities (Merino-Saum et al., 2020). The Smart City concept can be defined as a well-balanced combination of human beings, ethnic groups, energy, productive, social, and ecological systems that collaborate to address significant metropolitan concerns. Automation should be considered a tool for attaining the Smart City execution goals based on the area's requirements for the environment, people, business, and good governance. The term "Smart City" refers to a broader concept that encompasses the use of mechanisms to promote the interaction of diverse usefulness, facilities, and methods by increasing resource sustainability and optimising city administration efficiency to benefit people and economic growth. Assessment tools for Smart City Initiatives are crucial for the accurate assessment of Smart City installations, which benefits all stakeholders (Sharifi, 2020). Benefits can include enhancing the city's international image (Giffinger et al., 2007; Giffinger et al., 2010), prioritising the allocation of funds (Huovila et al., 2017), developing innovative performance-improvement techniques (Caird et al., 2016), and active participation in development activities (Debnath et al., 2014). The major objective of the Smart City assessment is to provide feedback and support with decision-making, allowing for an examination of whether initiatives are on track (Ahvenniemi et al., 2017).

However, big data may provide real-time assistance to Smart City Initiatives (Vieira et al., 2020). This would contribute to an ongoing evaluation of specific Smart City deployment areas such as water and energy consumption. It may provide insight into their evolution and enable a more detailed description of future modifications and actual proof of their usefulness. This ongoing observation may provide critical information for thoroughly examining the suitability of interventions implemented in specific areas. Implementing assessment methodologies would be challenging because Smart City projects are still in their infancy. According to this report, the primary motivation for smart cities is now utilitarian in nature (efficiency, saving resources). Smart cities should incorporate learning methods into their architecture to better appreciate the diversity and complexity of urban innovation Israilidis et al. (2021). As Valdez et al. (2018) point out, while the proper performance of smart city operations may be surprising information-intensive, municipal administrators and transportation providers are the primary information custodians.

Under different circumstances, the technological focus of Smart Cities should not obviate the need for a coherent and pertinent conceptual knowledge of the social environment in which the Smart City is aiming to solve problems. Expert interviews emphasised the quantifiability of Smart City initiatives. This enables the tracking and evaluation of progress, whether successful or unsuccessful. The major difficulty with Smart City endeavours is not performance monitoring; rather, it appears that financial resources and apps are crucial. As indicated by both research and practice, most cities worldwide are gradually adopting Smart City policies. It is self-evident that its economic benefit portfolio is feasible. As a result, smart cities are more robust and resilient than others. As a result, experts stressed the increased necessity of quantifiable economic advantages at this stage of Smart City development. The emphasis on adopting the recommended ideas appears to be high, similar to the start-up development and growth phases, but with a greater emphasis on structure building. Future research should focus on establishing Smart City Initiatives indicators to close existing gaps. It's worth contemplating when developing the ecosystem for smart cities should prioritise social and economic benefits.

8. Conclusion

The purpose of this essay was to discuss the economic benefits of Smart City efforts, which are crucial for social progress. Both the literature and the perspectives of experts provide a value proposition for Smart City Initiatives in terms of establishing a Smart Eco-system for stakeholders. Experts noted the significant economic benefits; however, strategising execution plans continues to be a challenge for institutions. Economic systems in a Smart City should be managed so that existing resources are divided evenly or more fairly among city residents to sustain and improve the asset equitably or more favourably. As a result of technological advancements and conversation automation, the Smart City has recently risen to prominence as a global urban development priority. In this context, an economic benefits portfolio is more accurately described as a collection of advantages that interact and reinforce one another following the European Union's Smart City Initiatives agenda. Although the concept of a smart city is still relatively new, it is gaining traction as governments globally emphasise smart city development. However, a new study option would be to quantify the economic benefits of smart cities using management and innovation theories as a foundation. As a result, economic sustainability would open up opportunities for human productivity enhancement.

9. Implications for Research

By 2050, cities will have grown to accommodate an additional 2.6 billion people, with two-thirds of them residing in Asia and Africa's expanding economies (Glasmeier et al., 2015). While this characteristic inspires cities to adopt smart city programmes, the desire to create inclusive smart cities compels urban planners to create an enabling environment at the municipal level for citizen-led IoT interventions. While governments in emerging economies frequently foster an enabling regulatory environment to encourage citizens to pursue entrepreneurial endeavours, normative institutions may continue to limit the regulatory environment's influence. Policymakers must establish a robust regulatory framework that enables citizen-led initiatives among the environment's four key

stakeholders. Additionally, colleges and the private sector must interact to maximise the impact of interventions. Entrepreneurs, for example, might be incorporated into the course design process to ensure that relevant skills are included in the curriculum. Places may gain from such collaboration to maintain residents and deter nascent entrepreneurs from relocating to neighbouring areas. On the other side, citizens must take responsibility for cultivating a strong community culture for citizen-led projects to gain the necessary exposure and acceptability.

10. Restrictions and Further Research

This study is restricted to expert assessments of the economic benefits of smart city programmes. Thus, smart city research must be integrated into legislation and policy formation for cities to evolve. To begin, practitioners in local government are implementing a range of Smart City Initiatives, sharing perceptions and lessons learned about what works and what doesn't, and why. One could argue that these lessons are not totally captured to inform future Smart City policy and practice. As the data demonstrates, policies associated with Smart City initiatives place a premium on resolving technology issues (Ruhlandt, 2018). Nontechnical issues are not a priority while developing and executing procedures. If correctly documented, lessons learned from previous Smart City programmes can impact national policy. Second, while ICT inclusion is the primary driver of Smart City growth, shareholder participation is critical to the success of Smart City implementation. Collaboration and creativity across municipal stakeholders, including public, private, and civic bodies, are required for Smart City efforts. Stakeholder engagement is a novel notion that must be polished in order to produce beneficial effects. The proposed proposals should be seen in light of current efforts to encourage institutional transformation and consider the political motivation for socio-technical governance to develop Smart cities (Giffinger et al., 2007). While the research successfully identified significant findings and contributed to the literature, it would have been more beneficial if it covered failing firms. Additionally, conclusions from a single city may not be generalisable. Thus, scholars must understand the institutional frameworks of other cities in emerging economies.

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