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SMART CITIES: INTEGRATING SMART TECHNOLOGY IN CITY DEVELOPMENT IN THE ECONOMY 5.0 ERA

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Abstract

In the Economy 5.0 era, the concept of smart cities is increasingly relevant with the integration of smart technology in urban development. Smart Cities emphasise the importance of using cutting-edge technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and big data analytics to improve the efficiency, safety, and quality of life of city dwellers. The implementation of this technology enables more effective management in various sectors, including transportation, energy, and health. However, the adoption of smart technology presents challenges such as cybersecurity, data privacy, and digital inequality, which require comprehensive attention and solutions through collaboration between the government, the private sector, and the community. With a holistic and collaborative approach, the integration of smart technology in city development can bring significant benefits to the sustainability and welfare of urban communities.

Keywords: Smart Cities, Integrating, Smart Technology, City Development, Economy 5.0 Era.

Introduction

The development of information and communication technology (ICT) has accelerated tremendously in recent decades. Starting from the era of mainframe computers in the 1960s that were only accessible to large institutions, to the evolution to personal computers (PCs) in the 1980s, computer technology has continued to evolve into smaller, faster, and more affordable. The internet revolution in the 1990s brought about a major transformation by enabling unlimited global connectivity (Harrison & Donnelly, 2011). Within a matter of years, email, websites, and e-commerce became an integral part of everyday life. This development continued with the advent of mobile devices and smartphones in the early 2000s, which combined communication, computing, and internet capabilities in one portable device (IBM Global Business Services, 2009).

Progress did not stop there. From the 2010s to the present, we have witnessed a new revolution in the form of cloud computing, big data, artificial intelligence (AI), and the Internet of Things (IoT). Cloud computing enables large-scale data storage and

processing that can be accessed from anywhere, supporting the growth of digital-based services such as SaaS (Software as a Service). Big data and AI enable the analysis of large amounts of data to gain valuable insights and automation in various sectors (Al Nuaimi et al., 2015). IoT connects everyday devices to the internet, enabling smarter and more efficient interactions. All these developments are not only changing the way we communicate and work, but also having a direct impact on various aspects of life, including education, health, transportation, and industry. With continuing progress, ICT shows increasing potential to make life better and more efficient in the future (Nam & Pardo, 2011).

The concept of 'Smart Cities' emerged in response to the challenges of rapid urbanisation. Smart Cities is an urban concept that effectively utilises information and communication technology (ICT) to manage city resources more efficiently and improve the quality of life of its citizens. In smart cities, various IoT devices and sensors are used to collect data in real-time, which is then analysed and used to make smart and informed decisions. For example, better traffic management through intelligent transportation systems, reduced energy consumption through smart electricity grids, and improved security and public services through data-based applications (Neirotti et al., 2014). The main goal of smart cities is to create a more sustainable, competitive, and sustainable urban environment with a focus on improving the welfare of city dwellers (Harrison & Donnelly, 2011).

Smart Cities combine technologies such as the Internet of Things (IoT), artificial intelligence (AI), and big data to create more efficient and responsive systems in various fields, including transportation, energy, waste management, and public services.

Economy 5.0, which is the main focus of the current era, emphasises the harmonisation between technological progress and human welfare. In contrast to previous economic eras that emphasised efficiency and productivity, Economy 5.0 emphasises sustainability and social inclusiveness. This means that cities not only need to become smarter, but also more empathetic and humane. Smart Cities are expected to become centres of innovation that not only improve operational efficiency, but also deliver sustainable social and environmental solutions (Piro et al., 2014).

However, the journey towards the development of effective Smart Cities is not without its challenges. Technical challenges such as complex system integration, connectivity, and data security are pressing issues that need to be addressed. In addition, social and economic challenges such as inclusiveness, the digital divide, and public participation also need attention. Governments and policymakers must be able to create a framework that supports the integration of smart technology while maintaining a balance between technological progress and the needs of society (Zanella et al., 2014).

In this context, this study aims to explore the integration of smart technology in urban development in the era of Economy 5.0. This study aims to identify the main

elements of smart technology that are feasible to implement, analyse their impact on various aspects of urban life, and formulate recommendations that can support sustainable and inclusive Smart Cities development strategies.

Research Methods

The study in this research uses the literature method. The literature research method, or often referred to as library research, is an approach used to collect and analyse information from various written sources relevant to a particular research topic. This method involves searching, collecting, evaluating, and synthesising diverse literature that may include books, journal articles, research reports, theses, dissertations, and other reliable sources (Creswell, 2013); (Cooper, 2010). The purpose of literature research is to understand and summarise existing knowledge, identify gaps in the literature, and provide a solid theoretical foundation for further research. This method is very important in academic research because it helps researchers strengthen their arguments and demonstrate coherence with previous findings in relevant fields of study (Boote & Beile, 2005).

Results and Discussion

Public Understanding of Smart Cities and Smart Technology

Currently, the concept of smart cities is increasingly popular in line with the development of information and communication technology (ICT). However, people's understanding of what smart cities are and how smart technology is involved in them varies. Some may consider smart cities to be only related to the use of high technology, while others may see it as a way to improve the efficiency of urban services (Dameri, 2013). Basically, a deeper and more comprehensive understanding of smart cities and smart technology is important to ensure the successful implementation of this concept in everyday life (Lara et al., 2019).

Smart cities involve various technological components such as IoT (Internet of Things) sensors, big data, and geographic information systems that are used to collect and analyse data. This data is then used to improve the efficiency of various urban aspects such as traffic, energy, water, and waste management. The public sometimes does not fully understand how complex the infrastructure needed to support smart cities is and how these technologies can interact to produce integrated solutions (Cocchia, 2014).

One of the main goals of smart cities is to improve the quality of life and well-being of the community. Through the use of smart technology, such as smart transportation systems and smart electricity grids, cities can reduce congestion, energy consumption, and environmental pollution. In addition, smart cities can also involve smart security systems that can reduce crime rates and health systems that can improve health services. However, the understanding of how these benefits are applied

concretely and how they impact the daily lives of citizens may not be uniform (Boote & Beile, 2005).

Despite offering various benefits, the implementation of smart cities also faces various challenges, one of which is the aspect of understanding and acceptance from the community. Some people may be concerned about the privacy and security of their personal data in an environment that is fully integrated with technology. In addition, there are also technological challenges, such as the digital divide, where not all citizens have the same access or ability to take advantage of new technology. Therefore, effective education and socialisation are very important to introduce the concept of smart cities and smart technology to the wider community (Schaffers et al., 2011).

Education and the dissemination of information play an important role in increasing public understanding of smart cities. The government, educational institutions, and the mass media can work together to convey information in a clear and easy-to-understand manner to all levels of society. Examples are through seminars, workshops, or public campaigns that discuss the benefits and implications of smart cities. In addition, the provision of technical training can also help people to be more skilled in using smart technology applied in their city (Caragliu et al., 2011).

Thus, a good understanding of smart cities and smart technology will enable people to actively participate in the transition process towards smart cities. Awareness and adequate knowledge enable citizens to provide meaningful input and collaborate with the government and the private sector to create more effective and inclusive solutions. Community involvement in every stage of smart city development will ensure that the technologies and initiatives introduced truly meet the needs and improve the quality of life of the entire city population. Thus, a good understanding of smart cities is an important foundation for a smarter and more sustainable urban future.

Level of Implementation and Adaptation of Smart Technology in Various Cities

Smart technology has become an important aspect in urban development in various parts of the world. The level of implementation and adaptation of this technology varies from one city to another, depending on a number of factors such as the level of the economy, infrastructure, government policy, and community readiness. Several major cities in developed countries such as Singapore, Tokyo, and Seoul have been pioneers in adopting smart technology by integrating various systems, such as smart transportation, energy management, and city security (Batty et al., 2012).

In Singapore, for example, the government has launched the Smart Nation initiative, which includes various efforts to improve the quality of life of its citizens through the use of advanced technology. A smart transportation system that connects train, bus, and taxi networks with real-time data analysis enables more efficient and environmentally friendly community mobility. In addition, smart home and smart building solutions have also been implemented to significantly reduce energy use, with

automation systems that can adjust electricity usage based on occupant activity (Giffinger & Gudrun, 2010).

Tokyo, as one of the largest cities in the world, is also not lagging behind in implementing smart technology. The city is developing a smart grid system to efficiently manage energy distribution and reduce the risk of power outages. In addition, smart technology is also being applied in the health sector with telemedicine and remote monitoring, enabling easier and faster access to health services. This initiative not only improves the efficiency of public services but also helps reduce the burden on health facilities (Giffinger & Gudrun, 2010).

Meanwhile, in cities in developing countries, the level of smart technology adoption varies and faces various challenges. One example is Jakarta, which is trying to integrate smart technology even though the existing infrastructure is not yet fully ready. Initial steps such as the implementation of e-parking and the use of smart applications for public transportation have begun. The main challenges faced are budget constraints, lack of infrastructure, and a need to increase public awareness (Schaffers et al., 2011).

In Latin America, cities such as Medellín in Colombia are making significant progress in the adaptation of smart technology. Medellín has succeeded in creating an efficient and integrated transport system with smartphone applications, utilising big data to improve city operations. This is being done to address urban problems such as congestion and pollution. In addition, the local government is also collaborating with various private parties to develop smart solutions that can be applied in various sectors (Albino et al., 2015).

The education and training sectors are also a focus for the application of smart technology in various cities. The use of smart devices in schools has helped in a more interactive and efficient learning process. Smart technology not only facilitates access to information for students, but also helps teachers deliver material in a more engaging way. Thus, the application and adaptation of smart technology can have a significant positive impact, although each city has a different pace in adopting it based on its own conditions (Su et al., 2011).

Overall, although the level of implementation and adaptation of smart technology varies across cities, the direction of development is increasingly showing a positive trend. The success of more developed cities in integrating smart technology can serve as an example and learning experience for other cities just starting out on their journey. This demonstrates the importance of cooperation between government, the private sector, and the community to realise an inclusive and sustainable smart city.

Impacts and Challenges in Smart Technology Integration

The integration of smart technology in various aspects of modern life has presented a number of significant impacts and challenges. One of the main positive

impacts is increased efficiency. Through the use of technologies such as the Internet of Things (IoT), advanced data analytics, and artificial intelligence (AI), business processes and human daily activities can be carried out more effectively and accurately. For example, in the manufacturing industry, smart sensors can monitor production lines in real-time, identify potential problems before they become bigger, and thus reduce downtime and repair costs (Angelidou, 2014).

However, on the other hand, there are significant challenges to be faced. One of the main challenges is cybersecurity. The integration of smart technology means an increase in the number of devices connected to the network, which has the potential to increase the risk of cyberattacks. These attacks can become more damaging as the amount of personal and business data collected and stored digitally increases. Therefore, it is important to continue developing and updating security measures to protect the integrity and confidentiality of data (Zygiaris, 2013).

In addition, technological transformation also poses social and economic challenges. One of the impacts is widening economic inequality. Workers who do not have advanced technological skills may find it difficult to compete in a job market increasingly dominated by the need for high technical abilities. This can widen the gap between those who have access to and mastery of technology and those who do not, resulting in new layers of inequality (Chieochan & Hossain, 2013).

In education, smart technology offers new ways to facilitate learning, such as through online learning platforms and smart learning tools. However, the main challenge is to ensure equitable access to these technologies across the population. In many regions, especially remote and underdeveloped areas, technological infrastructure is still a major obstacle. This difficulty of access can hamper efforts to provide equal learning opportunities for all (Bibri & Krogstie, 2017).

On the regulatory side, governments and authorities are faced with new challenges in regulating and overseeing the use of smart technology. Existing regulations may not be adequate to deal with the acceleration of technological innovation. This requires adaptive and proactive policies to control aspects such as data privacy, intellectual property rights, and the responsibility of technology developers. The involvement of various stakeholders is needed to create a regulatory ecosystem that can support the safe and sustainable growth of smart technology (Komninos, 2015).

Overall, the integration of smart technology has complex and diverse impacts, providing great benefits while presenting many challenges. In order to maximise benefits and minimise risks, a multidimensional approach is needed that includes strengthening technological infrastructure, improving workforce skills, updating regulations, and raising public awareness and preparedness for the era of smart technology. With the right understanding and effective strategies, the public can reap the optimal benefits of this technological advancement.

Conclusion

The integration of smart technology in urban development is a key step towards sustainable and innovative transformation. By utilising various advanced technologies such as IoT, AI, and big data, cities can create a more efficient, safe, and comfortable environment to live in. This smart technology enables various public services to operate more effectively, from traffic management and waste management to improvements in health and education services.

However, the implementation of smart technology in the development of smart cities also presents challenges that need to be addressed comprehensively. Issues of data security, privacy, and unequal access to technology can be major barriers. Therefore, an adaptive regulatory framework and inclusive policies are needed to ensure that all levels of society can feel the benefits of smart cities. In addition, partnerships between the public and private sectors and increased human resource capacity are also important to support the successful integration of this technology.

Overall, the development of smart cities in the Economy 5.0 era demands a holistic approach involving various stakeholders, including government, community, academia, and the private sector. With solid collaboration and a clear vision, cities around the world have a great opportunity to improve the quality of life of their citizens and achieve sustainable development goals. The integration of smart technology in urban development is not only a catalyst for positive change, but also a bridge to a more advanced and connected future.

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