

Leadership and Transformation Towards Smart Cities: Impact on Innovation and Business Performance in the Infrastructure Sector

Muhammad Ade Kurnia Harahap^{1*}, Suherlan², Achmad Choerudin³

¹Universitas Simalungun, Indonesia

²Universitas Subang, Indonesia

³Universitas Tunas Pembangunan Surakarta (UTP), Indonesia

Email: adekur2000@gmail.com¹, suherlanfia@gmail.com², achmadchoerudin77@yahoo.co.id³

Abstract. Smart cities represent a modern urbanization concept that leverages information and communication technology to enhance efficiency and quality of urban life. The transformation towards smart cities involves the integration of advanced technology, big data, and analytics to modernize urban infrastructure, such as transportation systems, energy, and public services. The primary goal of this research is to analyze how effective leadership can influence innovation and business performance in the infrastructure sector within the context of smart cities, as well as to provide insights into strategies and best practices that can be applied to achieve optimal outcomes. This study employs a literature review method with a qualitative approach and descriptive analysis. Data was gathered from Google Scholar for the period 2016 to 2024, aiming to collect and evaluate the latest articles relevant to the research topic. The study's findings indicate that effective leadership plays a key role in guiding and implementing smart city technologies, which, in turn, enhance innovation and performance in the infrastructure sector. The implementation of smart city technologies, such as smart traffic management systems and energy solutions, has proven to increase operational efficiency, sustainability, and the quality of life for citizens. Collaboration between government, the private sector, and the community is also found to be crucial in achieving optimal results from smart city transformations.

Keywords: Leadership, Transformation, Smart Cities, Innovation, Business Performance, Infrastructure

1. Introduction

Smart cities are a modern urbanization concept that integrates information and communication technology (ICT) to improve efficiency and quality of life in urban areas. The transformation towards smart cities involves the adoption of advanced technologies such as sensors, the Internet of Things (IoT), and big data analytics, which are used to modernize various urban infrastructures, including transportation systems, energy, and public services [1]. Smart cities aim to create more responsive, sustainable, and connected urban environments by leveraging real-time data. The main focus of this concept is on optimizing resource usage and enhancing the quality of public services through technology that can more accurately predict and respond to community needs. In Indonesia, the implementation of smart cities has become an increasingly growing trend, with various cities beginning to adopt this technology to improve residents' quality of life and operational efficiency. These initiatives often involve significant investments in digital infrastructure and systems that can effectively manage data to enhance city planning and policy execution.

Leadership plays a crucial role in the process of transitioning to smart cities. Leadership in this context involves strategic decision-making and the management of change necessitated by new technologies. Effective leaders must be capable of designing and implementing strategies that integrate technology with city policies and programs, while addressing potential challenges such as resistance to change and the need to align various stakeholder interests. The ability to inspire teams and ensure the commitment of all relevant parties is an essential aspect of successful leadership in smart city transformation [2]. With the right leadership, innovation can be effectively driven, which in turn can enhance business performance and create significant added value for

both the community and the private sector. Good leadership in this context must be able to manage the complexity of technology and rapid change with strong managerial and visionary skills.

Innovation in the infrastructure sector is often the result of the application of smart city technologies that improve operational efficiency and generate cost savings. Data-driven traffic management systems, smart energy management, and environmental monitoring systems are examples of technologies that can modernize urban infrastructure [3]. These technologies enhance the performance of city systems and optimize resource use, which can, in turn, reduce operational costs and increase sustainability. For example, integrated traffic management systems can reduce congestion and travel times, while smart energy management technology can lower energy consumption and carbon emissions. The implementation of these technologies requires significant initial investment but provides long-term benefits in the form of efficiency and cost savings that can strengthen the competitiveness of businesses in the infrastructure sector.

Collaboration between the government, private sector, and community is an essential element in the implementation of smart city technologies. Effective leadership must be able to build and maintain productive partnerships among various parties to achieve common goals. This involves managing complex and often conflicting relationships, as well as ensuring that each party understands and supports the vision and objectives of the smart city. These partnerships can help accelerate the process of technology implementation and improve the outcomes achieved. Collaboration is also important in addressing challenges that may arise during the transformation process, such as data privacy issues and cybersecurity threats, which require a joint approach to effective solutions [4]. Successful leadership in this context must be able to create synergy among different stakeholders and direct collaborative efforts towards achieving optimal results.

In the context of smart cities, sustainability becomes a primary focus, encompassing environmental, social, and economic aspects. Effective leadership must be able to integrate sustainability principles into every aspect of smart city technology implementation. This means considering the environmental impact of the technologies applied, ensuring that smart city initiatives provide equitable social benefits, and supporting sustainable economic models. Integrating these sustainability principles is essential to ensuring that smart city transformations not only improve efficiency and quality of life but also contribute to environmental preservation and community well-being. Leadership must be able to lead change with a holistic vision and ensure that all technological initiatives align with long-term sustainability goals [5].

With the rapid advancement of technology and the need for cities to adapt to changing times, it is important to evaluate the impact of leadership and the transformation of smart cities on innovation and business performance in the infrastructure sector. This research aims to identify how effective leadership can influence innovation outcomes and business performance within the context of smart cities. This evaluation will provide insights into how leadership strategies and best practices can be applied to achieve optimal results in smart city development. Additionally, this study will explain the role of technology and collaboration in supporting smart city transformations and how this can provide greater benefits for both the community and the private sector.

1.1. Leadership

Leadership is the process of influencing and guiding individuals or groups to achieve common goals through effective communication, inspiration, and clear strategies [6]. It encompasses the ability to motivate and direct others, make wise decisions, and create a vision and mission that can guide the actions and behaviors of a team. Leadership involves developing strong relationships and building trust among team members, as well as managing the changes and challenges faced [7]. In the context of organizations and projects like smart cities, effective leadership plays a crucial role in driving innovation, managing the implementation of technology, and ensuring that all stakeholders work towards the same objectives.

1.2. Transformation

Transformation refers to the process of profound and significant change in the structure, processes, or working methods of an organization, system, or society, aimed at improving overall efficiency, effectiveness, or performance [8]. Transformation involves adopting new ideas, technologies, or approaches that replace old ways, as well as adapting to changes in the external and internal environment [9]. In the context of smart cities, transformation includes the integration of advanced technology into city infrastructure, changes in the way public services are operated, and adjustments in policies and strategies to improve quality of life and operational efficiency, with the goal of creating a more responsive and sustainable urban environment.

1.3. Smart Cities

Smart cities are a modern urbanization concept that utilizes information and communication technology to enhance the quality of life, efficiency, and sustainability of cities [10]. Smart cities optimize the management of

urban infrastructure, including transportation, energy, and public services by integrating various technologies such as IoT sensors, big data, and analytical systems. The main objective is to make cities more responsive to the needs of their residents, reduce environmental impact, and improve services and overall quality of life. Smart cities aim to create more intelligent, efficient, and connected urban environments, where data and technology are used to make better decisions and respond to urban challenges [11].

1.4. Innovation

Innovation is the process of creating or implementing new ideas, products, services, or methods that provide more effective, efficient, or creative solutions to specific problems or needs [12]. Innovation involves the development and application of new knowledge to bring about significant change, whether in the form of new technology, better business models, or more effective approaches in various fields. The goal of innovation is to improve performance, add value, and create competitive advantages, whether for organizations, communities, or industries as a whole [13], [14]. Innovation is not limited to new inventions but also includes continuous improvements and adaptations that support progress and growth [15].

1.5. Business Performance

Business performance refers to the extent to which a company or organization achieves its set goals and objectives through various metrics and indicators [16], [17]. This involves evaluating key aspects such as operational efficiency, productivity, profitability, customer satisfaction, and market growth. Business performance is measured by financial outcomes like profit and revenue, as well as non-financial factors such as product quality, innovation, and competitiveness. Assessing business performance helps determine the effectiveness of a company's strategies and operations, and identifies areas that need improvement to achieve long-term success [18], [19].

1.6. Infrastructure

Infrastructure is the basic system and structure that supports the operations and functions of a country, city, or organization, encompassing the physical facilities and services necessary to support economic activities and daily life [20]. This includes elements such as highways, bridges, transportation networks, water supply and sanitation systems, power grids, telecommunications, and public facilities like hospitals and schools. Infrastructure plays a crucial role in ensuring smooth operations and growth, as well as supporting the quality of life by providing access to essential services and facilitating efficient economic activities [21].

2. Method

This research utilizes a literature review method with a qualitative approach and descriptive analysis to explore "Leadership and Transformation Towards Smart Cities: Impacts on Innovation and Business Performance in the Infrastructure Sector." The qualitative approach allows the researcher to gain an in-depth understanding of the phenomenon under study through analysis and interpretation of data from secondary sources. In this case, data is sourced from Google Scholar for the period 2016 to 2024, with the aim of collecting and evaluating the most recent articles relevant to the research topic. The data collection process begins with a literature search on Google Scholar using keywords related to the research topic. The initial search identified 61 articles that met the search criteria. A rigorous selection process was then conducted based on the relevance and quality of the articles to the research focus. The selection criteria included the alignment of the articles with the themes of smart cities, leadership, innovation, and business performance in the infrastructure sector, as well as the contribution of the articles to the understanding of these concepts. After the selection process, 32 articles were chosen as the primary sources for this literature review. These articles were analyzed descriptively to identify patterns, themes, and key findings relevant to the research topic. Descriptive analysis was conducted to provide a comprehensive overview of the relationships between leadership, transformation towards smart cities, and their impact on innovation and business performance in the infrastructure sector. The results of this literature review are expected to provide in-depth insights and significant contributions to the existing literature, as well as practical recommendations for the implementation of smart cities and infrastructure sector management.

3. Result and Discussion

This discussion will elaborate on how leadership and transformation towards smart cities influence innovation and business performance in the infrastructure sector. The analysis is based on a literature review

with a qualitative approach and descriptive analysis of 25 selected articles. The main focus is to explore the relationship between leadership strategies, the implementation of smart city technologies, and their impact on the infrastructure sector. Effective leadership is a key element in the development of smart cities, as leaders must be able to formulate a clear vision and direct the implementation of innovative smart technologies [22]. Strong leadership can shape strategic directions that support the success of smart city initiatives, as seen in major projects such as Jakarta Smart City. In this initiative, the Jakarta City Government has taken an active role in launching various technological projects such as traffic management systems and public data platforms. These projects demonstrate the power of leadership in formulating and implementing smart technology strategies and show how visionary leadership can inspire various stakeholders to contribute to smarter and more efficient city transformations. Leadership has a direct impact on the operational efficiency and effectiveness of the city, facilitating better management and overall improvement in public service quality by developing integrated technology-based infrastructure.

Technology is at the core of smart city development and plays a major role in enhancing city service efficiency and quality [23]. Technologies such as sensors, the Internet of Things (IoT), and analytics are used to optimize various aspects of city life. For example, the implementation of a smart parking system in Barcelona demonstrates how sensor technology can monitor parking space availability in real-time, reducing congestion and vehicle emissions. This system improves parking management efficiency and affects the overall performance of city infrastructure. Through this technology, Barcelona has successfully reduced parking search times and the environmental impact of vehicles, highlighting how smart technology integration can bring significant environmental and operational benefits in the context of a smart city. Barcelona's success in managing parking serves as a concrete example of how technology application can address complex urban issues and create a more convenient and eco-friendly city experience.

Innovation driven by smart city technology can transform operational paradigms in the infrastructure sector [24]. The smart grid technology implemented in San Francisco is a concrete example of how innovation can enhance energy distribution efficiency. San Francisco has successfully managed energy consumption more efficiently, reducing waste and lowering operational costs by utilizing smart grid technology. This innovation improves energy efficiency and contributes to sustainability in the infrastructure sector. The application of smart technology in energy management demonstrates how innovation can drive the achievement of smart city goals, including more effective resource management and reduced environmental impact. This innovation illustrates the great potential of technology to transform how we manage infrastructure and tackle global challenges such as climate change and unsustainable energy dependence.

The implementation of smart city technology has a significant impact on business performance in the infrastructure sector [25]. Companies involved in smart city projects often experience increased operational efficiency and competitiveness. For example, PT Wika, a major construction company in Indonesia, has been involved in various smart infrastructure projects. The integration of technology in these projects has enhanced effectiveness and reduced costs, ultimately improving the company's business performance. This case illustrates how technology can be a strategic tool for enhancing competitiveness and efficiency in the infrastructure sector, and provide positive impacts on the business outcomes of the involved companies. PT Wika's experience shows how adopting smart technology can bring direct benefits to companies, improve processes, and enhance competitive positioning in the market.

Collaboration between the government and the private sector is a crucial element in the success of smart city development [26]. Smart city projects often require close cooperation among various parties, including government agencies, technology companies, and the community. A successful example of such collaboration can be seen in smart city projects in Seoul, South Korea. In Seoul, the city government collaborates with technology companies and universities to develop smart solutions in transportation and energy. This collaboration ensures that all stakeholders play an active role in technological transformation and contribute to the successful implementation of smart city initiatives. Such collaboration is important for creating synergy that supports effective achievement of smart city goals, strengthening cooperation networks, and ensuring that the developed solutions are widely accepted and utilized by the community.

Sustainability is one of the primary goals of smart city development. Smart city technologies are designed to reduce environmental impact and enhance quality of life [27]. The "Smart Green City" project in Singapore is an example of successful sustainability implementation. This project integrates green technology and environmental management systems to create a more eco-friendly city. Through this initiative, Singapore has successfully reduced its carbon footprint and improved the quality of life for its residents. The success of this project demonstrates how leadership and technology can synergize to achieve sustainability goals in developing greener and more efficient cities. This initiative also highlights the importance of sustainability strategies in designing smart cities that meet current needs while preserving resources for future generations.

Although many benefits are derived from smart city implementations, they also face various challenges. Issues such as data privacy, high costs, and resistance to change are major obstacles in deploying smart city technologies. For instance, the smart city project in Mumbai, India, has encountered challenges related to data privacy and high costs. Addressing these challenges requires a strategic approach and innovative solutions involving all stakeholders. Effective solutions must be designed to address these issues and ensure successful technology implementation without compromising privacy and financial sustainability. Developing robust risk mitigation plans and adaptation strategies is crucial to overcoming these challenges and ensuring that the benefits of smart city technologies can be maximized without neglecting important aspects such as privacy and costs.

The implementation of smart city technologies can enhance quality of life by providing more efficient and responsive services [28]. For example, the air quality monitoring system in Beijing, China, provides real-time information about pollution levels and necessary protective measures. This system helps increase awareness and public health by providing relevant data to the public. The use of technology to monitor air quality and provide information to residents illustrates how smart cities can contribute to improved quality of life through smarter and more responsive services. This system also highlights the importance of transparency and accessibility of information for supporting public health and well-being.

Smart city technologies contribute to improved operational efficiency in the infrastructure sector [29]. For instance, the smart energy management systems implemented in cities like Amsterdam enable real-time monitoring and management of energy consumption. This system helps reduce waste and improve efficiency in energy use. The application of this technology demonstrates how smart city solutions can aid in more effective resource management, contribute to achieving smart city goals, and enhance operational efficiency in the infrastructure sector. This technology also shows how integrating smart solutions in infrastructure can result in cost savings and increased environmental sustainability.

Data plays a central role in smart cities, providing a basis for better and more responsive decision-making [30]. The use of big data for city analysis and planning allows leaders and companies to identify patterns, predict needs, and design more effective solutions. An example of data use is seen in the smart city project in London, where transportation data is used to plan infrastructure improvements and optimize transportation networks. Effective data use enables better city planning and responsiveness to community needs. Integrating data into city management also strengthens analytical capacity and data-driven decision-making, which can enhance the quality and effectiveness of public services.

Transformation towards smart cities can positively impact the local economy by creating new business opportunities and increasing investment attractiveness [31]. Smart city projects such as the "Songdo International Business District" in South Korea have attracted international investment and created new job opportunities. This smart city development demonstrates how investment in smart technology and infrastructure can contribute significantly to the economy, create new business opportunities, and enhance investment appeal in the region. This project illustrates how smart cities can act as catalysts for local and global economic growth.

A clear and comprehensive strategic plan is key to the successful implementation of smart cities [32]. Leaders must develop strategies that include long-term planning, risk management, and continuous evaluation. An example of such a strategic plan is seen in India's "Smart City Mission" project, where strategic plans were developed to encompass various aspects of technology, infrastructure, and sustainability. This plan reflects the importance of a strategic approach in implementing smart cities and achieving broader urban development goals. A well-developed strategic plan allows for better coordination among various stakeholders and optimizes resource allocation for achieving set objectives.

Overall, effective leadership, the implementation of smart city technologies, and innovation have a significant impact on business performance in the infrastructure sector. The case studies described show how technology integration can enhance efficiency, sustainability, and quality of life. Collaboration among various parties plays a crucial role in the success of this transformation, and this research provides in-depth insights into how smart cities can be built and managed to achieve broader urban and economic development goals. This research is expected to contribute to a better understanding and implementation of smart cities, as well as expand knowledge on how technology and leadership can synergize to drive progress in the infrastructure sector.

Table 1. Key Findings on Leadership, Smart Cities, Innovation, and Business Performance in the Infrastructure Sector

No	Aspect	Key Finding
1	Leadership	Visionary and strategic leadership drives the success of smart city transformations and technology implementation.

2	Smart City Technology	Implementation of technologies such as traffic management systems and smart energy solutions enhances efficiency and sustainability.
3	Innovation	Smart city technologies stimulate innovation in the infrastructure sector, improving operational efficiency and business competitiveness
4	Business Performance	Smart city technologies improve business performance by enhancing operational efficiency and reducing costs.
5	Collaboration	Collaboration among government, private sector, and community is crucial for the successful implementation of smart cities.
6	Sustainability	Smart city projects support sustainability goals by reducing environmental impact and improving quality of life.
7	Challenges	Challenges such as data privacy issues, high costs, and resistance to change need to be addressed for success.
8	Quality of Life	Smart city technologies enhance quality of life through more efficient and responsive services.
9	Operational Efficiency	Smart city technologies, such as smart grids and monitoring systems, boost operational efficiency in the infrastructure sector.
10	Data	Big data and analytics play a critical role in better planning and management of smart cities.
11	Local Economy	Smart city transformation can drive local economic growth and attract new investments.
12	Strategy	Comprehensive strategic planning is necessary to manage implementation and risks in smart city projects.

4. Conclusion

This research examines the impact of leadership and the transformation towards smart cities on innovation and business performance in the infrastructure sector through a literature review with a qualitative approach and descriptive analysis. From the analysis of 32 relevant articles, it can be concluded that effective leadership plays a key role in guiding and implementing smart city technologies, which in turn enhances innovation and performance in the infrastructure sector. The implementation of smart city technologies, such as smart traffic management systems and energy solutions, has been shown to improve operational efficiency, sustainability, and the quality of life for citizens. Collaboration between government, the private sector, and the community is also proven to be crucial in achieving optimal outcomes from smart city transformations.

The findings of this research have significant implications for stakeholders in the smart city and infrastructure sectors. For governments, the results indicate the need for visionary leadership and well-planned strategies to drive the success of smart city projects. The private sector, especially infrastructure and technology companies, can leverage these findings to develop more innovative and sustainable solutions and to enhance their competitiveness. Additionally, the community will benefit from improved service quality and a better living environment.

Based on the research findings, several recommendations can be made to enhance the implementation of smart cities in the future. First, city leaders need to develop a clear and integrated vision for smart cities and involve all stakeholders in planning and execution. Second, it is essential to strengthen collaboration between government, the private sector, and the community to ensure the successful implementation of technology and its effective use. Third, continuous evaluation and monitoring of smart city projects are necessary to identify and address challenges and to ensure that the expected benefits are realized.

This research has several limitations that should be noted. First, the literature review approach with descriptive analysis may not fully capture the complex dynamics involved in the implementation of smart cities and their impact on the infrastructure sector. Second, the data sourced from Google Scholar is limited to articles available in that database, which may not cover all relevant research. Third, focusing the research on the 2016-2024 period may limit insights into developments and trends that may have emerged before this period. Lastly, the study does not consider local contextual differences that may influence the implementation and impact of smart cities in various regions.

References

- [1] O. A. Adenekan, Chinedu Ezeigweneme, and Excel Great Chukwurah, "The evolution of smart cities: Integrating technology, governance, and sustainable development," *International Journal of Applied Research in Social Sciences*, vol. 6, no. 5, pp. 891–902, May 2024, doi: 10.51594/ijarss.v6i5.1131.
- [2] A. Sancino and L. Hudson, "Leadership in, of, and for smart cities – case studies from Europe, America, and Australia," *Public Management Review*, vol. 22, no. 5, pp. 701–725, May 2020, doi: 10.1080/14719037.2020.1718189.
- [3] H. P. Nguyen, Phuoc Quy Phong Nguyen, and Viet Duc Bui, "Applications of Big Data Analytics in Traffic Management in Intelligent Transportation Systems," *INTERNATIONAL JOURNAL ON INFORMATICS VISUALIZATION*, vol. 6, no. 1–2, pp. 177–187, 2022.
- [4] F. Cremer et al., "Cyber risk and cybersecurity: a systematic review of data availability," *Geneva Pap Risk Insur Issues Pract*, vol. 47, no. 3, pp. 698–736, Jul. 2022, doi: 10.1057/s41288-022-00266-6.
- [5] M. Beena, P. B. Rao, and V. B. R. Meegada, "The Role of Sustainable Leadership in Ensuring Long-Term Success," in *Data-Driven Intelligent Business Sustainability*, IGI Global, 2023, pp. 248–261. doi: 10.4018/979-8-3693-0049-7.ch017.
- [6] A. Zen, S. Siminto, M. A. K. Harahap, Y. B. Prasetya, and A. M. A. Ausat, "Effective Leadership: A Literature Review of Concepts, Characteristics, and Best Practices," *Innovative: Journal Of Social Science Research*, vol. 3, no. 2, pp. 2209–2219, 2023, doi: <https://doi.org/10.31004/innovative.v3i2.430>.
- [7] A. M. A. Ausat, S. Suherlan, T. Peirisal, and Z. Hirawan, "The Effect of Transformational Leadership on Organizational Commitment and Work Performance," *Journal of Leadership in Organizations*, vol. 4, no. 4, pp. 61–82, Mar. 2022, doi: 10.22146/jlo.71846.
- [8] S. Kraus, P. Jones, N. Kailer, A. Weinmann, N. Chaparro-Banegas, and N. Roig-Tierno, "Digital Transformation: An Overview of the Current State of the Art of Research," *Sage Open*, vol. 11, no. 3, p. 215824402110475, Jul. 2021, doi: 10.1177/21582440211047576.
- [9] D. Plekhanov, H. Franke, and T. H. Netland, "Digital transformation: A review and research agenda," *European Management Journal*, vol. 41, no. 6, pp. 821–844, Dec. 2023, doi: 10.1016/j.emj.2022.09.007.
- [10] J. S. Gracias, G. S. Parnell, E. Specking, E. A. Pohl, and R. Buchanan, "Smart Cities—A Structured Literature Review," *Smart Cities*, vol. 6, no. 4, pp. 1719–1743, Jul. 2023, doi: 10.3390/smartcities6040080.
- [11] M. A. Berawi, Mustika Sari, and Perdana Miraj, "Developing Sustainable Smart Cities to Improve Citizen's Quality of Life and Well-Being," *CSID Journal of Infrastructure Development*, vol. 6, no. 1, pp. 1–3, Jun. 2023, doi: 10.7454/jid.v6.i1.1088.
- [12] P. Diawati, S. S. Gadzali, A. J. Mahardhani, B. Irawan, and A. M. A. Ausat, "Analysing the Dynamics of Human Innovation in Administration," *Jurnal Ekonomi*, vol. 12, no. 02, pp. 537–540, 2023, Accessed: Apr. 04, 2023. [Online]. Available: <https://ejournal.seaninstitute.or.id/index.php/Ekonomi/article/view/1652>
- [13] A. Yani, D. O. Suparwata, and Hamka, "Product and Service Innovation Strategies to Expand MSME Markets," *Journal of Contemporary Administration and Management (ADMAN)*, vol. 1, no. 3, pp. 163–169, Nov. 2023, doi: 10.61100/adman.v1i3.67.
- [14] Sutrisno, P. Diawati, L. F. Muhamad, R. M. Permana, and D. O. Suparwata, "Innovative Strategies of SMEs in Alignment with Community Needs," *Jurnal Terobosan Peduli Masyarakat (TIRAKAT)*, vol. 1, no. 1, pp. 30–38, Jan. 2024, doi: 10.61100/j.tirakat.v1i1.103.
- [15] A. M. A. Ausat, R. Velmurugan, M. M. Mazil, M. A. Mazher, and M. O. Okombo, "Utilisation of Natural Resources as a Source of Inspiration and Innovation in SME Development," *Apollo: Journal of Tourism and Business*, vol. 1, no. 3, pp. 122–132, 2023, doi: 10.58905/apollo.v1i3.103.
- [16] D. Bernardus, M. F. Arisa, S. A. Sufa, and D. O. Suparwata, "Supporting Start-ups in Indonesia: Examining Government Policies, Incubator Business, and Sustainable Structure for Entrepreneurial Ecosystems and Capital," *International Journal of Business, Law, and Education*, vol. 5, no. 1, pp. 236–259, Jan. 2024, doi: 10.56442/ijble.v5i1.372.
- [17] M. R. Ohara, D. O. Suparwata, and S. Rijal, "Revolutionary Marketing Strategy: Optimising Social Media Utilisation as an Effective Tool for MSMEs in the Digital Age," *Journal of Contemporary Administration and Management (ADMAN)*, vol. 2, no. 1, pp. 313–318, 2024, doi: <https://doi.org/10.61100/adman.v2i1.125>.
- [18] Sutrisno, A. M. A. Ausat, B. Permana, and M. A. K. Harahap, "Do Information Technology and Human Resources Create Business Performance: A Review," *International Journal of Professional Business Review*, vol. 8, no. 8, p. e02206, Aug. 2023, doi: 10.26668/businessreview/2023.v8i8.2206.

- [19] N. C. Lewaherilla, S. Sutrisno, A. M. A. Ausat, and S. S. Gadzali, "The Relationship Between Intellectual Capital, Innovative Work Behavior, and Business Performance," *Quality-Access to Success*, vol. 25, no. 201, pp. 303–311, May 2024, doi: 10.47750/QAS/25.201.33.
- [20] L. K. Bates et al., "Infrastructure That Connects/Infrastructure That Divides," *Planning Theory & Practice*, vol. 24, no. 1, pp. 99–130, Jan. 2023, doi: 10.1080/14649357.2023.2166287.
- [21] Muslimin, "Optimizing Public Sector Management in Infrastructure Development to Improve Community Quality of Life," *JURNAL PRIMABONE*, vol. X, no. I, pp. 49–58, 2023.
- [22] T. B. Bayu, "Smart leadership for smart cities," *Smart Cities and Regional Development (SCRD) Journal*, vol. v4, no. i2, pp. 40–62, 2020.
- [23] J. M. López-Quiles and M. P. Rodríguez Bolívar, "Smart Technologies for Smart Governments: A Review of Technological Tools in Smart Cities," in *Smart Technologies for Smart Governments*, Springer International Publishing AG 2018, 2018, pp. 1–18. doi: 10.1007/978-3-319-58577-2_1.
- [24] A. M. Younus, "Smart City in Urban Innovation: Concept, Management, Policy and Technology," *International Journal of Advanced Engineering Research and Science*, vol. 8, no. 10, pp. 001–014, 2021, doi: 10.22161/ijaers.810.1.
- [25] L. Judijanto, Moh. Erkamim, E. Dolphina, and I. W. K. Utama, "Implementation of Digitalization of City Infrastructure for Improved Sustainability: Case Study on Smart City Project in Surabaya, Indonesia," *West Science Nature and Technology*, vol. 1, no. 02, pp. 64–72, Dec. 2023, doi: 10.58812/wsnt.v1i02.488.
- [26] X. Quan and M. C. W. Solheim, "Public-private partnerships in smart cities: A critical survey and research agenda," *City, Culture and Society*, vol. 32, p. 100491, Mar. 2023, doi: 10.1016/j.ccs.2022.100491.
- [27] H. Ramli, Z. M. Azizi, and N. Thurairajah, "Sustainable Smart City Technologies and Their Impact on Users' Energy Consumption Behaviour," *Energies (Basel)*, vol. 17, no. 4, p. 771, Feb. 2024, doi: 10.3390/en17040771.
- [28] D. A. P. Yohana and J. Riyanto, "A Study on the Implementation of the Smart City Concept in Indonesia, Study on the Capital City of Jakarta," *Journal on Education*, vol. 5, no. 4, pp. 15689–15702, 2023.
- [29] Y. Wei, H. Yuan, and H. Li, "Exploring the Contribution of Advanced Systems in Smart City Development for the Regeneration of Urban Industrial Heritage," *Buildings*, vol. 14, no. 3, p. 583, Feb. 2024, doi: 10.3390/buildings14030583.
- [30] I. A. T. Hashem et al., "The role of big data in smart city," *Int J Inf Manage*, vol. 36, no. 5, pp. 748–758, Oct. 2016, doi: 10.1016/j.ijinfomgt.2016.05.002.
- [31] S. Perätalo, P. Ahokangas, and M. Iivari, "Smart city business model approach: the role of opportunities, values, and advantages," *Innovation: The European Journal of Social Science Research*, pp. 1–25, Nov. 2023, doi: 10.1080/13511610.2023.2286439.
- [32] S.-C. Kim, P. Hong, T. Lee, A. Lee, and S.-H. Park, "Determining Strategic Priorities for Smart City Development: Case Studies of South Korean and International Smart Cities," *Sustainability*, vol. 14, no. 16, p. 10001, Aug. 2022, doi: 10.3390/su141610001.