

# **Influential Article Review - The Relationship of Innovation and Smart Cities**

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*This paper examines technological innovation and sustainability. We present insights from a highly influential paper. Here are the highlights from this paper: By 2050, the population living in major cities, especially in developing countries, will have increased twofold. With the increasing majority of the population occurring in urban areas, it is crucial to focus on how technological innovation can help to deliver a sustainable future. A sustainable city strives to create a sustainable living environment through the use of technology. Thus, the main objective of this paper is to review the impact of technological innovation on building a more sustainable city. Technological innovation has changed the overall effectiveness and benevolence over time and with regard to sustainability. A sustainable city involves development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development encompasses all aspects of environmental stewardship, social development, and economic progress. For our overseas readers, we then present the insights from this paper in Spanish, French, Portuguese, and German.*

*Keywords: Technological innovation, Sustainable city, Environment, Social, Economy*

## **SUMMARY**

- Technological innovation involves «the introduction of something new, or a new idea, method, or device». Sustainable development must take into account the effectiveness of the technology .
- Innovation in technological change. Innovation is related to how consumers perceive an idea, a practice, a product, or an object as a new thing, and begins with consumers' awareness of the innovation. Meanwhile, diffusion is a process in which information about the innovation is conveyed through certain channels over time among the consumers . Vergragt discussed that innovation goes beyond invention. It refers to the spread of new technology into the wider society.
- The development of technological innovation has led to the sixth generation. Rothwell mentioned that the development of technological innovation in the first stage up to the fifth has already begun since the 1950s. The generations of innovation include technology push, market/demand pull, coupling, cross-functioning, as well as integration and networking. Hasan and Adomdza added another generation, a sixth generation, known as design-driven innovation. It means to design new products whilst simultaneously creating a need for consumers. Technological change and sustainability are closely related to each other. Both factors form the innovation in order to improve the effectiveness of environmental stewardship, social development, and economic progress .

- Environmental dimension is related to the objectives of the conservation and preservation of the environment.
- Cities are at the crossroads of implementing system changes for sustainable development. Paradigm shifts are needed in multiple dimensions to redefine the relations of cities with the environment» . «Cities impact their immediate environment, as well as the global environment» . According to Sharma , a sustainable city includes environmental sustainability, heritage conservation, appropriate technology, infrastructure efficiency, placemaking, social access, transit-oriented development, regional integration, human scale, and institutional integrity.
- Energy consumption in urban areas is as much as 75%. It also accounts for 70% of carbon dioxide emissions. To meet the needs of the population in urban areas, infrastructure development sometimes ignores ecological sustainability. Living in urban areas has contributed to pressure on the ecosystem. Human ecological footprint has exceeded the capacity of terrestrial ecosystems for as much as 50%. The level of ecosystem services at the moment is risky at a critical level of degradation.
- The aspect of social development towards building a more sustainable city «occurs when the formal and informal actively support the capacity of current and future generations to create healthy and liveable communities». This social aspect covers equity, diversity, quality of life, democracy and governance, and interconnectedness .
- If environmental and social losses resulting from economic growth turn out to be higher than economic benefits, the overall result for people’s well being becomes negative.
- It is very important to understand the challenges of a contemporary city. The challenge is due to the increasingly complex nature and the variety of the contemporary city . Thus, a future city needs to balance economic development with energy efficiency and the preservation of natural resources in order to improve the quality of life . «Balancing the immediate needs of today without compromising the needs of tomorrow is at the heart of being a sustainable city, and of this report»

## HIGHLY INFLUENTIAL ARTICLE

We used the following article as a basis of our evaluation:

Goi, C.-L. (2017). The impact of technological innovation on building a sustainable city. *International Journal of Quality Innovation*, 3(1), 1–13.

This is the link to the publisher’s website:

<https://jqualityinnovation.springeropen.com/articles/10.1186/s40887-017-0014-9>

## INTRODUCTION

Cities can be classified based on the cities proper (administrative), the extent of the urban area, or the metropolitan regions [1]. The Organisation for Economic Co-operation and Development (OECD) [2] also classified the size of cities based on four categories. First, a large metropolitan area has a population of 1.5 million or more. Second, the metropolitan area has a population between 500,000 and 1.5 million people. Third, a medium-sized urban area has a population of about 200,000 to 500,000 people. Fourth, a small-sized urban area has a population of about 500,000 to 200,000 people.

“The world is undergoing the largest wave of urban growth in history. More than half of the world’s population now lives in towns and cities” [3]. From 1950 to 2010, 1.3 billion people lived in small cities, 632 million people lived in medium-sized cities, and 570 million people lived in large cities [4]. By 2050, the population living in cities, especially in developing countries, will have increased twofold. Thus, “the problems created by rampant urbanisation are among the most important challenges of our time. They also represent one of the greatest opportunities – and responsibilities – for the private sector. Business is uniquely positioned to shape the sustainable, economically competitive cities of the future” [5]. With urban

areas containing the increasing majority of the population, it is very important to focus on how technological innovation can help deliver a sustainable future. A smart sustainable city strives to create a sustainable living environment through the use of technology [6]. “Transforming cities for the better through sustainable technology” [7].

There are several issues that pose a major impact on the quality of life that drives the shift towards a more sustainable city. First, there is a rapid rise in the number of people who move into and live in cities. Trends and lifestyle have led to the development of infrastructure and buildings, along with cultural and social practices without destroying nature and the environment. Therefore, there is a need to create a smart city by involving smart energy management, infrastructure development, waste and environment management, public-private partnerships, economic development plans, smart healthcare, and smart education programs. Second, it is a huge challenge to transform a city through sustainable technological innovation. Sometimes a city fails to recognise the challenges of the digital divide [8]. The development of the tomorrow sustainable city must be well planned, offers services, involves the community, and includes well-linked whole systems.

Thus, the key question that has been addressed is whether technological innovation has an impact on building a sustainable city.

This paper provides an original approach that offers a discussion of the impact of technological change on building a sustainable city. Furthermore, a substantial number of references are included to indicate the specific researches for the analysis of this topic. The paper is organised as follows:

- The first section is related to technological innovation. This section covers the overview of technological innovation and also innovation in technological change.
- The second section is related to the discussion of a sustainable city. This section covers a few issues related mainly to the environment, social, and economy.
- The third section covers the impact of technological innovation on building a sustainable city.
- The final section discusses the conclusion and the limitations for future research.

## CONCLUSION

The world is undergoing an endless wave of urban growth. By 2050, the population living in cities will have increased twofold. One of the reasons that lead to this process is because a smart sustainable city strives to create a sustainable living environment through the use of technology. Technological innovation has affected effectiveness and delivered a sustainable future for city development. Thus, this paper plays a crucial role in analysing the impact of technological innovation on building a sustainable city.

The first analysis found that technological innovation has changed the overall effectiveness and benevolence with regard to sustainability. With the rapid growth of a city, technological innovation has changed the patterns of people. The use of technology has led to significant development of the sixth-generation technology. There is even a relationship between legitimacy pressure, profitability, and green innovation. Green innovation is an important approach for achieving sustainable city development. Second, a sustainable city creates an enduring way of life across environment, social, and economy. There are various aspects to redefine the relationship between city and environment. It is important to formulate strategies, transformations, renewals, and regenerations. This involves creating a green city in terms of urban form, transportation system, and energy and resources. Social aspects involve equity, diversity, quality of life, democracy and governance, and interconnectedness. Meanwhile, the economy contributes to the sustainability and efficient functioning of a city, especially the benefits in an economic context of private individual benefits and public goods benefits. Overall, the impact of technological innovation has a positive impact on building a more sustainable city, especially in terms of environment, social, and economy. Thus, authorities, especially local government and city planners, should not neglect the importance of technological innovation.

However, this research has a few limitations. First, the preparation of this paper is based on the number of publications. Thus, it is without the field collection of primary data. Second, the lifespan of each sustainable city framework or model is not analysed. Technological change is speeding up. The pace of

innovation is not just accelerating slightly, but exponentially [71]. The problem is whether the people can rival with the speed of technological innovation. Technological innovation advancements are accelerating faster than the abilities of the people to try to adapt and use them [72]. Also, the implementation of the framework or model for a sustainable city is usually more focused on a specific city, rather than to all cities. By adopting a sustainable model from other cities without the guided mould of a city is likely leading to a disaster. However, it is important to think global, act local.

Future research will be conducted for the continuation of this study. More specifically, it is the causal relationships that must be researched in order to measure the relationship between the influence of technological innovation on building a sustainable city (refer to Fig. 3). There are undiscovered potentials in technological innovation, especially new ideas, methods, and devices to transform a city towards sustainability. Thus, the design of the proposed research propositions is as follows:

- Proposition 1: The new idea of technological innovation has an impact on building a sustainable city.
- Proposition 2: The method of technological innovation has an impact on building a sustainable city.
- Proposition 3: The device of technological innovation has an impact on building a sustainable city.

The research will be based on quantitative research, and a city will be chosen. Thus, we will choose Kuala Lumpur as our research city. As discussed by [73], Kuala Lumpur has a great policy and smart-city framework. Malaysia, as a whole, is a multi-racial, multi-religion, and multicultural country. One of the challenges of a city is the need to ensure economic, social, and environmental sustainability now and in the medium- and long-term future. In the recent decade, researchers have discussed the importance of social sustainability within urban studies [74]. The data collection shall involve government sectors, especially city council, residents of the city, and business sectors.

## **APPENDIX**

### **FIGURE 1 HYPE CYCLE FOR EMERGING TECHNOLOGIES**



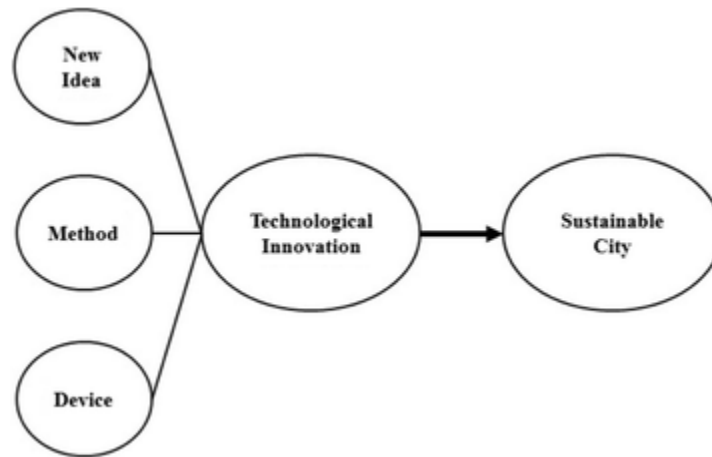
Source: Gartner [17]

**FIGURE 2  
THREE INDICATORS FOR SOCIAL SUSTAINABILITY**

Access to basic necessities	Vulnerability to shocks	Social cohesion
Access to sanitation	Vulnerable employment	Income Gini index
Access to improved drinking water	Extent of informal economy	Social mobility
Access to healthcare	Social safety net protection	Youth unemployment

Source: The World Economic Forum [61]

**FIGURE 3  
RESEARCH MODEL**



**TABLE 1**  
**EIU'S THE GREEN CITY INDEX**

CO2	Energy	Buildings	Transport
<ul style="list-style-type: none"> <li>• CO2 intensity</li> <li>• CO2 emissions</li> <li>• CO2 reduction strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Energy consumption</li> <li>• Energy intensity</li> <li>• Renewable energy consumption</li> <li>• Clean and efficient energy policies</li> </ul>	<ul style="list-style-type: none"> <li>• Energy consumption of residential buildings</li> <li>• Energy-efficient buildings standards</li> <li>• Energy-efficient buildings initiatives</li> </ul>	<ul style="list-style-type: none"> <li>• Use of non-car transport</li> <li>• Size of non-car transport network</li> <li>• Green transport promotion</li> <li>• Congestion reduction policies</li> </ul>
Waste and land use	Water	Air quality	Environmental governance
<ul style="list-style-type: none"> <li>• Municipal waste production</li> <li>• Waste recycling</li> <li>• Waste reduction policies</li> <li>• Green land use policies</li> </ul>	<ul style="list-style-type: none"> <li>• Water consumption</li> <li>• System leakages</li> <li>• Wastewater system treatment</li> <li>• Water efficiency and treatment policies</li> </ul>	<ul style="list-style-type: none"> <li>• Nitrogen dioxide</li> <li>• Sulphur dioxide</li> <li>• Ozone</li> <li>• Particulate matter</li> <li>• Clean air policies</li> </ul>	<ul style="list-style-type: none"> <li>• Green action plan</li> <li>• Green management</li> <li>• Public participation in green policy</li> </ul>

Source: The Economist Intelligence Unit (EIU) [55]

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## **TRANSLATED VERSION: SPANISH**

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

## **VERSION TRADUCIDA: ESPAÑOL**

A continuación se muestra una traducción aproximada de las ideas presentadas anteriormente. Esto se hizo para dar una comprensión general de las ideas presentadas en el documento. Por favor, disculpe cualquier error gramatical y no responsabilite a los autores originales de estos errores.

## **INTRODUCCIÓN**

Las ciudades se pueden clasificar en función de las ciudades propiamente dichas (administrativas), la extensión del área urbana o las regiones metropolitanas [1]. La Organización para la Cooperación y el Desarrollo Económicos (OCDE) [2] también clasificó el tamaño de las ciudades en función de cuatro categorías. En primer lugar, una gran área metropolitana tiene una población de 1,5 millones o más. En segundo lugar, el área metropolitana tiene una población de entre 500.000 y 1,5 millones de personas. En tercer lugar, una zona urbana de tamaño mediano tiene una población de entre 200.000 y 500.000 personas. En cuarto lugar, una zona urbana de pequeño tamaño tiene una población de entre 500.000 y 200.000 personas.

"El mundo está experimentando la mayor ola de crecimiento urbano de la historia. Más de la mitad de la población mundial vive ahora en pueblos y ciudades" [3]. De 1950 a 2010, 1.300 millones de personas viven en pequeñas ciudades, 632 millones de personas viven en ciudades medianas y 570 millones de personas viven en grandes ciudades [4]. Para 2050, la población que vive en ciudades, especialmente en los países en desarrollo, se habrá multiplicado por dos. Así, "los problemas creados por la urbanización desenfrenada son algunos de los desafíos más importantes de nuestro tiempo. También representan una de las mayores oportunidades y responsabilidades para el sector privado. Los negocios están en una posición única para dar forma a las ciudades sostenibles y económicamente competitivas del futuro" [5]. Dado que las zonas urbanas contienen la creciente mayoría de la población, es muy importante centrarse en cómo la innovación tecnológica puede ayudar a lograr un futuro sostenible. Una ciudad inteligente y sostenible se esfuerza por crear un entorno de vida sostenible a través del uso de la tecnología [6]. "Transformar las ciudades para mejorar a través de la tecnología sostenible" [7].

Hay varias cuestiones que plantean un gran impacto en la calidad de vida que impulsa el cambio hacia una ciudad más sostenible. En primer lugar, hay un rápido aumento en el número de personas que se mudan y viven en ciudades. Las tendencias y el estilo de vida han llevado al desarrollo de infraestructuras y edificios, junto con prácticas culturales y sociales sin destruir la naturaleza y el medio ambiente. Por lo tanto, es necesario crear una ciudad inteligente mediante la gestión inteligente de la energía, el desarrollo de la infraestructura, la gestión de residuos y medio ambiente, las asociaciones público-privadas, los planes de desarrollo económico, la atención sanitaria inteligente y los programas de educación inteligente. En segundo lugar, es un gran reto transformar una ciudad a través de la innovación tecnológica sostenible. A veces una ciudad no reconoce los desafíos de la brecha digital [8]. El desarrollo de la ciudad sostenible mañana debe estar bien planificado, ofrece servicios, involucra a la comunidad e incluye sistemas enteros bien vinculados.

Por lo tanto, la cuestión clave que se ha abordado es si la innovación tecnológica tiene un impacto en la construcción de una ciudad sostenible.

Este documento proporciona un enfoque original que ofrece una discusión sobre el impacto del cambio tecnológico en la construcción de una ciudad sostenible. Además, se incluye un número sustancial de referencias para indicar las investigaciones específicas para el análisis de este tema. El documento se organiza de la siguiente manera:

- La primera sección está relacionada con la innovación tecnológica. Esta sección abarca la visión general de la innovación tecnológica y también la innovación en el cambio tecnológico.
- La segunda sección está relacionada con la discusión de una ciudad sostenible. Esta sección cubre algunas cuestiones relacionadas principalmente con el medio ambiente, lo social y la economía.
- La tercera sección abarca el impacto de la innovación tecnológica en la construcción de una ciudad sostenible.
- En la sección final se analizan la conclusión y las limitaciones para futuras investigaciones.

## CONCLUSIÓN

El mundo está experimentando una ola interminable de crecimiento urbano. Para 2050, la población que vive en las ciudades se habrá multiplicado por dos. Una de las razones que conducen a este proceso es porque una ciudad inteligente y sostenible se esfuerza por crear un entorno de vida sostenible a través del uso de la tecnología. La innovación tecnológica ha afectado a la eficacia y ha dado un futuro sostenible para el desarrollo de la ciudad. Por lo tanto, este documento desempeña un papel crucial en el análisis del impacto de la innovación tecnológica en la construcción de una ciudad sostenible.

El primer análisis determinó que la innovación tecnológica ha cambiado la eficacia general y la benevolencia con respecto a la sostenibilidad. Con el rápido crecimiento de una ciudad, la innovación tecnológica ha cambiado los patrones de las personas. El uso de la tecnología ha llevado al desarrollo significativo de la tecnología de sexta generación. Incluso existe una relación entre la presión de legitimidad, la rentabilidad y la innovación ecológica. La innovación ecológica es un enfoque importante para lograr el desarrollo sostenible de las ciudades. En segundo lugar, una ciudad sostenible crea una forma

de vida duradera en medio ambiente, social y económico. Hay varios aspectos para redefinir la relación entre la ciudad y el medio ambiente. Es importante formular estrategias, transformaciones, renovaciones y regeneraciones. Esto implica crear una ciudad verde en términos de forma urbana, sistema de transporte y energía y recursos. Los aspectos sociales implican la equidad, la diversidad, la calidad de vida, la democracia y la gobernanza, y la interconexión. Mientras tanto, la economía contribuye a la sostenibilidad y al funcionamiento eficiente de una ciudad, especialmente los beneficios en un contexto económico de beneficios individuales privados y beneficios de bienes públicos. En general, el impacto de la innovación tecnológica tiene un impacto positivo en la construcción de una ciudad más sostenible, especialmente en términos de medio ambiente, social y economía. Por lo tanto, las autoridades, especialmente los gobiernos locales y los planificadores de ciudades, no deben descuidar la importancia de la innovación tecnológica.

Sin embargo, esta investigación tiene algunas limitaciones. En primer lugar, la preparación de este documento se basa en el número de publicaciones. Por lo tanto, es sin la recopilación de campos de datos primarios. En segundo lugar, no se analiza la vida útil de cada marco o modelo urbano sostenible. El cambio tecnológico se está acelerando. El ritmo de la innovación no sólo se está acelerando ligeramente, sino exponencialmente [71]. El problema es si la gente puede rivalizar con la velocidad de la innovación tecnológica. Los avances en innovación tecnológica se están acelerando más rápido que las capacidades de las personas para tratar de adaptarse y utilizarlos [72]. Además, la implementación del marco o modelo para una ciudad sostenible suele estar más centrada en una ciudad específica, en lugar de en todas las ciudades. Al adoptar un modelo sostenible de otras ciudades sin el molde guiado de una ciudad, es probable que conduzca a un desastre. Sin embargo, es importante pensar globalmente, actuar localmente.

Se llevarán a cabo investigaciones futuras para la continuación de este estudio. Más concretamente, son las relaciones causales las que deben investigarse para medir la relación entre la influencia de la innovación tecnológica en la construcción de una ciudad sostenible (véase la Fig. 3). Hay potenciales desconocidos en la innovación tecnológica, especialmente nuevas ideas, métodos y dispositivos para transformar una ciudad hacia la sostenibilidad. Por lo tanto, el diseño de las propuestas de investigación propuestas es el siguiente:

- Proposición 1: La nueva idea de la innovación tecnológica tiene un impacto en la construcción de una ciudad sostenible.
- Proposición 2: El método de innovación tecnológica tiene un impacto en la construcción de una ciudad sostenible.
- Proposición 3: El dispositivo de innovación tecnológica tiene un impacto en la construcción de una ciudad sostenible.

La investigación se basará en la investigación cuantitativa, y se elegirá una ciudad. Por lo tanto, elegiremos Kuala Lumpur como nuestra ciudad de investigación. Como se discutió en [73], Kuala Lumpur tiene una gran política y un marco de ciudad inteligente. Malasia, en su conjunto, es un país multirracial, multirra regional y multicultural. Uno de los retos de una ciudad es la necesidad de garantizar la sostenibilidad económica, social y medioambiental ahora y en el futuro a medio y largo plazo. En la última década, los investigadores han discutido la importancia de la sostenibilidad social dentro de los estudios urbanos [74]. La recopilación de datos implicará a los sectores gubernamentales, especialmente el ayuntamiento, los residentes de la ciudad y los sectores empresariales.

## **TRANSLATED VERSION: FRENCH**

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

## **VERSION TRADUITE: FRANÇAIS**

Voici une traduction approximative des idées présentées ci-dessus. Cela a été fait pour donner une compréhension générale des idées présentées dans le document. Veuillez excuser toutes les erreurs grammaticales et ne pas tenir les auteurs originaux responsables de ces erreurs.

## INTRODUCTION

Les villes peuvent être classées en fonction des villes appropriées (administratives), de l'étendue de la zone urbaine ou des régions métropolitaines [1]. L'Organisation de coopération et de développement économiques (OCDE) [2] a également classé la taille des villes en fonction de quatre catégories. Premièrement, une grande région métropolitaine compte 1,5 million d'habitants ou plus. Deuxièmement, la région métropolitaine a une population entre 500 000 et 1,5 million de personnes. Troisièmement, une zone urbaine de taille moyenne compte entre 200 000 et 500 000 habitants. Quatrièmement, une petite zone urbaine compte entre 500 000 et 200 000 habitants.

« Le monde connaît la plus grande vague de croissance urbaine de l'histoire. Plus de la moitié de la population mondiale vit aujourd'hui dans des villes [3]. De 1950 à 2010, 1,3 milliard de personnes vivent dans de petites villes, 632 millions de personnes vivent dans des villes moyennes et 570 millions de personnes vivent dans les grandes villes [4]. D'ici 2050, la population vivant dans les villes, en particulier dans les pays en développement, aura été multipliée par deux. Ainsi, « les problèmes créés par l'urbanisation rampante sont parmi les défis les plus importants de notre temps. Elles représentent également l'une des plus grandes opportunités – et responsabilités – pour le secteur privé. Les entreprises sont particulièrement bien placées pour façonner les villes durables et économiquement compétitives de l'avenir » [5]. Les zones urbaines qui abritent la majorité croissante de la population, il est très important de se concentrer sur la façon dont l'innovation technologique peut contribuer à assurer un avenir durable. Une ville intelligente et durable s'efforce de créer un milieu de vie durable grâce à l'utilisation de la technologie [6]. « Transformer les villes pour le mieux grâce à une technologie durable » [7].

Il y a plusieurs problèmes qui ont un impact majeur sur la qualité de vie qui poussent le virage vers une ville plus durable. Premièrement, il y a une augmentation rapide du nombre de personnes qui s'installent et vivent dans les villes. Les tendances et le mode de vie ont conduit au développement d'infrastructures et de bâtiments, ainsi que des pratiques culturelles et sociales sans détruire la nature et l'environnement. Par conséquent, il est nécessaire de créer une ville intelligente en impliquant la gestion intelligente de l'énergie, le développement de l'infrastructure, la gestion des déchets et de l'environnement, les partenariats public-privé, les plans de développement économique, les soins de santé intelligents et les programmes d'éducation intelligente. Deuxièmement, c'est un énorme défi de transformer une ville par l'innovation technologique durable. Parfois, une ville ne reconnaît pas les défis de la fracture numérique [8]. Le développement de la ville durable de demain doit être bien planifié, offre des services, implique la communauté et comprend des systèmes entiers bien reliés.

Ainsi, la question clé qui a été abordée est de savoir si l'innovation technologique a un impact sur la construction d'une ville durable.

Ce document offre une approche originale qui offre une discussion sur l'impact des changements technologiques sur la construction d'une ville durable. En outre, un nombre important de références sont incluses pour indiquer les recherches spécifiques pour l'analyse de ce sujet. Le document est organisé comme suit:

- La première section est liée à l'innovation technologique. Cette section couvre la vue d'ensemble de l'innovation technologique et aussi l'innovation dans le changement technologique.
- La deuxième section est liée à la discussion d'une ville durable. Cette section couvre quelques questions liées principalement à l'environnement, sociale et économique.
- La troisième section porte sur l'impact de l'innovation technologique sur la construction d'une ville durable.
- La dernière section traite de la conclusion et des limites de la recherche future.

## CONCLUSION

Le monde connaît une vague sans fin de croissance urbaine. D'ici 2050, la population vivant dans les villes aura été multipliée par deux. L'une des raisons qui mènent à ce processus est qu'une ville intelligente et durable s'efforce de créer un milieu de vie durable grâce à l'utilisation de la technologie. L'innovation technologique a affecté l'efficacité et a donné un avenir durable au développement urbain. Ainsi, cet article joue un rôle crucial dans l'analyse de l'impact de l'innovation technologique sur la construction d'une ville durable.

La première analyse a révélé que l'innovation technologique a modifié l'efficacité globale et la bienveillance en matière de durabilité. Avec la croissance rapide d'une ville, l'innovation technologique a changé les modèles des gens. L'utilisation de la technologie a mené au développement significatif de la technologie de sixième génération. Il y a même un lien entre la pression de légitimité, la rentabilité et l'innovation verte. L'innovation verte est une approche importante pour la réalisation du développement durable des villes. Deuxièmement, une ville durable crée un mode de vie durable à travers l'environnement, le social et l'économie. Il existe différents aspects pour redéfinir la relation entre la ville et l'environnement. Il est important de formuler des stratégies, des transformations, des renouvellements et des régénérations. Il s'agit de créer une ville verte en termes de forme urbaine, de système de transport, d'énergie et de ressources. Les aspects sociaux impliquent l'équité, la diversité, la qualité de vie, la démocratie et la gouvernance, et l'interconnectivité. Pendant ce temps, l'économie contribue à la durabilité et au fonctionnement efficace d'une ville, en particulier les avantages dans un contexte économique d'avantages individuels privés et de biens publics. Dans l'ensemble, l'impact de l'innovation technologique a un impact positif sur la construction d'une ville plus durable, en particulier en termes d'environnement, de social et d'économie. Ainsi, les autorités, en particulier les administrations locales et les urbanistes, ne devraient pas négliger l'importance de l'innovation technologique.

Cependant, cette recherche a quelques limites. Premièrement, la préparation du présent document est basée sur le nombre de publications. Ainsi, il est sans la collecte sur le terrain des données primaires. Deuxièmement, la durée de vie de chaque cadre ou modèle de ville durable n'est pas analysée. Les changements technologiques s'accroissent. Le rythme de l'innovation ne s'accroît pas seulement légèrement, mais de façon exponentielle [71]. Le problème est de savoir si les gens peuvent rivaliser avec la vitesse de l'innovation technologique. Les progrès de l'innovation technologique s'accroissent plus rapidement que les capacités des gens à essayer de les adapter et de les utiliser [72]. En outre, la mise en œuvre du cadre ou du modèle pour une ville durable est généralement plus axée sur une ville spécifique, plutôt que sur toutes les villes. En adoptant un modèle durable d'autres villes sans le moule guidé d'une ville est susceptible de conduire à une catastrophe. Cependant, il est important de penser globale, agir localement.

Des recherches futures seront menées pour la poursuite de cette étude. Plus précisément, ce sont les relations causales qui doivent être étudiées afin de mesurer la relation entre l'influence de l'innovation technologique sur la construction d'une ville durable (voir fig. 3). Il existe des potentiels inconnus dans l'innovation technologique, en particulier les nouvelles idées, méthodes et dispositifs pour transformer une ville vers la durabilité. Ainsi, la conception des propositions de recherche proposées est la suivante :

- Proposition 1 : La nouvelle idée de l'innovation technologique a un impact sur la construction d'une ville durable.
- Proposition 2 : La méthode d'innovation technologique a un impact sur la construction d'une ville durable.
- Proposition 3 : Le dispositif d'innovation technologique a un impact sur la construction d'une ville durable.

La recherche sera basée sur la recherche quantitative, et une ville sera choisie. Ainsi, nous choisirons Kuala Lumpur comme notre ville de recherche. Comme nous l'avons vu [73], Kuala Lumpur dispose d'un excellent cadre politique et de la ville intelligente. La Malaisie, dans son ensemble, est un pays multiracial, multi-religieux et multiculturel. L'un des défis d'une ville est la nécessité d'assurer la durabilité économique, sociale et environnementale aujourd'hui et à moyen et à long terme. Au cours de la dernière décennie, les chercheurs ont discuté de l'importance de la durabilité sociale dans les études urbaines [74].

La collecte de données concerne les secteurs gouvernementaux, en particulier le conseil municipal, les résidents de la ville et les secteurs d'activité.

## **TRANSLATED VERSION: GERMAN**

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

## **ÜBERSETZTE VERSION: DEUTSCH**

Hier ist eine ungefähre Übersetzung der oben vorgestellten Ideen. Dies wurde getan, um ein allgemeines Verständnis der in dem Dokument vorgestellten Ideen zu vermitteln. Bitte entschuldigen Sie alle grammatikalischen Fehler und machen Sie die ursprünglichen Autoren nicht für diese Fehler verantwortlich.

## **EINLEITUNG**

Städte können nach den Städten (administrativ), der Ausdehnung des Stadtgebiets oder den Metropolregionen klassifiziert werden [1]. Die Organisation für wirtschaftliche Zusammenarbeit und Entwicklung (OECD) [2] ordnete auch die Größe der Städte nach vier Kategorien ein. Erstens hat eine große Metropolregion 1,5 Millionen Einwohner oder mehr. Zweitens hat die Metropolregion eine Bevölkerung zwischen 500.000 und 1,5 Millionen Menschen. Drittens hat ein mittelgroßes Stadtgebiet etwa 200.000 bis 500.000 Einwohner. Viertens hat ein kleines Stadtgebiet etwa 500.000 bis 200.000 Einwohner.

"Die Welt durchläuft die größte Welle des städtischen Wachstums in der Geschichte. Mehr als die Hälfte der Weltbevölkerung lebt heute in Städten" [3]. Von 1950 bis 2010 leben 1,3 Milliarden Menschen in kleinen Städten, 632 Millionen Menschen in mittelgroßen Städten und 570 Millionen Menschen in Großstädten [4]. Bis 2050 wird sich die Bevölkerung in Städten, insbesondere in Entwicklungsländern, verzweifacht haben. So gehören "die Probleme, die durch die grassierende Urbanisierung entstehen, zu den wichtigsten Herausforderungen unserer Zeit. Sie stellen auch eine der größten Chancen – und Verantwortlichkeiten – für den Privatsektor dar. Das Geschäft ist einzigartig positioniert, um die nachhaltigen, wirtschaftlich wettbewerbsfähigen Städte der Zukunft zu gestalten" [5]. Angesichts der zunehmenden Mehrheit der Bevölkerung in städtischen Gebieten ist es sehr wichtig, sich darauf zu konzentrieren, wie technologische Innovation zu einer nachhaltigen Zukunft beitragen kann. Eine intelligente, nachhaltige Stadt ist bestrebt, durch den Einsatz von Technologie ein nachhaltiges Lebensumfeld zu schaffen [6]. "Städte durch nachhaltige Technologie zum Besseren transformieren" [7].

Es gibt mehrere Themen, die einen großen Einfluss auf die Lebensqualität haben, die den Wandel hin zu einer nachhaltigeren Stadt vorantreiben. Erstens steigt die Zahl der Menschen, die in Städte einziehen und dort leben, rapide an. Trends und Lebensstil haben zur Entwicklung von Infrastruktur und Gebäuden sowie zu kulturellen und sozialen Praktiken geführt, ohne die Natur und die Umwelt zu zerstören. Daher ist es notwendig, eine intelligente Stadt zu schaffen, indem intelligentes Energiemanagement, Infrastrukturentwicklung, Abfall- und Umweltmanagement, öffentlich-private Partnerschaften, wirtschaftliche Entwicklungspläne, intelligente Gesundheitsversorgung und intelligente Bildungsprogramme eingebunden werden. Zweitens ist es eine große Herausforderung, eine Stadt durch nachhaltige technologische Innovation zu transformieren. Manchmal erkennt eine Stadt die Herausforderungen der digitalen Kluft nicht [8]. Die Entwicklung der Zukunft nachhaltigen Stadt muss gut geplant sein, bietet Dienstleistungen, bezieht die Gemeinschaft ein und schließt gut vernetzte ganze Systeme ein.

Die schlüsselfertige Frage, die angesprochen wurde, ist also, ob technologische Innovation Auswirkungen auf den Aufbau einer nachhaltigen Stadt hat.

Dieses Papier bietet einen originellen Ansatz, der eine Diskussion über die Auswirkungen des technologischen Wandels auf den Aufbau einer nachhaltigen Stadt bietet. Darüber hinaus wird eine beträchtliche Anzahl von Referenzen aufgenommen, um die spezifischen Untersuchungen für die Analyse dieses Themas aufzuzeigen. Das Papier ist wie folgt organisiert:

- Der erste Abschnitt bezieht sich auf technologische Innovation. Dieser Abschnitt behandelt den Überblick über technologische Innovation und auch Innovation im technologischen Wandel.
- Der zweite Abschnitt bezieht sich auf die Diskussion über eine nachhaltige Stadt. In diesem Abschnitt werden einige Fragen behandelt, die hauptsächlich umwelt-, sozial und wirtschaftlich zusammenhängen.
- Der dritte Abschnitt befasst sich mit den Auswirkungen technologischer Innovationen auf den Aufbau einer nachhaltigen Stadt.
- Im letzten Abschnitt werden die Schlussfolgerungen und die Grenzen für die zukünftige Forschung erörtert.

## **SCHLUSSFOLGERUNG**

Die Welt durchläuft eine endlose Welle städtischen Wachstums. Bis 2050 wird sich die Zahl der in den Städten lebenden Menschen verzweifacht haben. Einer der Gründe, die zu diesem Prozess führen, ist, dass eine intelligente, nachhaltige Stadt bestrebt ist, durch den Einsatz von Technologie ein nachhaltiges Lebensumfeld zu schaffen. Technologische Innovationen haben die Effektivität beeinflusst und eine nachhaltige Zukunft für die Stadtentwicklung ermöglicht. Daher spielt dieses Papier eine entscheidende Rolle bei der Analyse der Auswirkungen technologischer Innovationen auf den Aufbau einer nachhaltigen Stadt.

Die erste Analyse ergab, dass technologische Innovation die allgemeine Wirksamkeit und das Wohlbefinden in Bezug auf Nachhaltigkeit verändert hat. Mit dem raschen Wachstum einer Stadt hat technologische Innovation die Muster der Menschen verändert. Der Einsatz von Technologie hat zu einer signifikanten Entwicklung der Technologie der sechsten Generation geführt. Es besteht sogar ein Zusammenhang zwischen Legitimitätsdruck, Rentabilität und grüner Innovation. Grüne Innovation ist ein wichtiger Ansatz für eine nachhaltige Stadtentwicklung. Zweitens schafft eine nachhaltige Stadt eine dauerhafte Lebensweise in Umwelt, Soziales und Wirtschaft. Es gibt verschiedene Aspekte, um das Verhältnis zwischen Stadt und Umwelt neu zu definieren. Es ist wichtig, Strategien, Transformationen, Erneuerungen und Regenerationen zu formulieren. Dazu gehört die Schaffung einer grünen Stadt in Bezug auf städtische Form, Verkehrssystem, Energie und Ressourcen. Soziale Aspekte umfassen Gerechtigkeit, Vielfalt, Lebensqualität, Demokratie und Regierungsführung sowie Vernetzung. In der Zwischenzeit trägt die Wirtschaft zur Nachhaltigkeit und zum effizienten Funktionieren einer Stadt bei, insbesondere zu den Vorteilen privater und öffentlicher Güter. Insgesamt wirken sich technologische Innovationen positiv auf den Aufbau einer nachhaltigeren Stadt aus, insbesondere in Bezug auf Umwelt, Soziales und Wirtschaft. Daher sollten Behörden, insbesondere lokale Behörden und Stadtplaner, die Bedeutung technologischer Innovation nicht vernachlässigen.

Diese Forschung hat jedoch einige Einschränkungen. Erstens basiert die Erstellung dieses Papiers auf der Anzahl der Veröffentlichungen. Somit ist es ohne die Feldsammlung von Primärdaten. Zweitens wird die Lebensdauer jedes nachhaltigen Stadtrahmens oder Modells nicht analysiert. Der technologische Wandel beschleunigt sich. Das Innovationstempo beschleunigt sich nicht nur leicht, sondern exponentiell [71]. Das Problem ist, ob die Menschen mit der Geschwindigkeit der technologischen Innovation konkurrieren können. Technologische Innovationsfortschritte beschleunigen sich schneller als die Fähigkeit der Menschen, sich anzupassen und zu nutzen [72]. Auch die Umsetzung des Rahmens oder Modells für eine nachhaltige Stadt ist in der Regel mehr auf eine bestimmte Stadt als auf alle Städte ausgerichtet. Wenn man ein nachhaltiges Modell aus anderen Städten ohne die führende Form einer Stadt anwendet, wird dies wahrscheinlich zu einer Katastrophe führen. Es ist jedoch wichtig, global zu denken, lokal zu handeln.

Für die Fortsetzung dieser Studie werden in Zukunft Forschungsarbeiten durchgeführt. Genauer gesagt müssen die kausalen Zusammenhänge erforscht werden, um den Zusammenhang zwischen dem Einfluss



technologischer Innovation auf den Aufbau einer nachhaltigen Stadt zu messen (siehe Abb. 3). Es gibt unentdeckte Potenziale in technologischer Innovation, vor allem neue Ideen, Methoden und Geräte, um eine Stadt in Richtung Nachhaltigkeit zu verwandeln. Daher ist die Gestaltung der vorgeschlagenen Forschungsvorschläge wie folgt:

- Vorschlag 1: Die neue Idee der technologischen Innovation wirkt sich auf den Aufbau einer nachhaltigen Stadt aus.
- Vorschlag 2: Die Methode der technologischen Innovation wirkt sich auf den Aufbau einer nachhaltigen Stadt aus.
- Vorschlag 3: Das Gerät der technologischen Innovation hat Auswirkungen auf den Aufbau einer nachhaltigen Stadt.

Die Forschung wird auf quantitativer Forschung basieren, und es wird eine Stadt ausgewählt. Daher werden wir Kuala Lumpur als unsere Forschungsstadt wählen. Wie von [73] diskutiert, hat Kuala Lumpur einen großartigen politischen und intelligenten Rahmen. Malaysia als Ganzes ist ein multirassisches, multireligiöses und multikulturelles Land. Eine der Herausforderungen einer Stadt ist die Notwendigkeit, die wirtschaftliche, soziale und ökologische Nachhaltigkeit jetzt und in der mittel- und langfristigen Zukunft zu gewährleisten. In den letzten zehn Jahren haben Forscher die Bedeutung der sozialen Nachhaltigkeit in Stadtstudien diskutiert [74]. Die Datenerhebung umfasst staatliche Sektoren, insbesondere Stadtrat, Einwohner der Stadt und Wirtschaftssektoren.

## **TRANSLATED VERSION: PORTUGUESE**

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

## **VERSÃO TRADUZIDA: PORTUGUÊS**

Aqui está uma tradução aproximada das ideias acima apresentadas. Isto foi feito para dar uma compreensão geral das ideias apresentadas no documento. Por favor, desculpe todos os erros gramaticais e não responsabilize os autores originais responsáveis por estes erros.

## **INTRODUÇÃO**

As cidades podem ser classificadas com base nas cidades próprias (administrativas), na extensão da área urbana ou nas regiões metropolitanas [1]. A Organização para a Cooperação e Desenvolvimento Econômico (OCDE) [2] também classificou o tamanho das cidades com base em quatro categorias. Primeiro, uma grande área metropolitana tem uma população de 1,5 milhão ou mais. Em segundo lugar, a região metropolitana tem uma população entre 500.000 e 1,5 milhão de pessoas. Em terceiro lugar, uma área urbana de médio porte tem uma população de cerca de 200.000 a 500.000 pessoas. Em quarto lugar, uma área urbana de pequeno porte tem uma população de cerca de 500.000 a 200.000 pessoas.

"O mundo está passando pela maior onda de crescimento urbano da história. Mais da metade da população mundial vive hoje em cidades e cidades" [3]. De 1950 a 2010, 1,3 bilhão de pessoas vivem em cidades pequenas, 632 milhões de pessoas vivem em cidades de médio porte e 570 milhões de pessoas vivem em grandes cidades [4]. Até 2050, a população que vive em cidades, especialmente nos países em desenvolvimento, terá aumentado duas vezes. Assim, "os problemas criados pela urbanização desenfreada estão entre os desafios mais importantes do nosso tempo. Também representam uma das maiores oportunidades – e responsabilidades – para o setor privado. Os negócios estão posicionados exclusivamente para moldar as cidades sustentáveis e economicamente competitivas do futuro" [5]. Com áreas urbanas que contêm a crescente maioria da população, é muito importante focar em como a inovação tecnológica pode ajudar a proporcionar um futuro sustentável. Uma cidade inteligente e sustentável se esforça para criar um

ambiente de vida sustentável através do uso da tecnologia [6]. "Transformando cidades para melhor através da tecnologia sustentável" [7].

Existem várias questões que representam um grande impacto na qualidade de vida que impulsiona a mudança para uma cidade mais sustentável. Em primeiro lugar, há um rápido aumento no número de pessoas que se mudam e vivem nas cidades. Tendências e estilo de vida levaram ao desenvolvimento de infraestrutura e edifícios, juntamente com práticas culturais e sociais sem destruir a natureza e o meio ambiente. Portanto, é necessário criar uma cidade inteligente envolvendo gestão inteligente de energia, desenvolvimento de infraestrutura, gestão de resíduos e meio ambiente, parcerias público-privadas, planos de desenvolvimento econômico, saúde inteligente e programas de educação inteligente. Em segundo lugar, é um grande desafio transformar uma cidade através da inovação tecnológica sustentável. Às vezes, uma cidade não reconhece os desafios da divisão digital [8]. O desenvolvimento da cidade sustentável do futuro deve ser bem planejado, oferece serviços, envolve a comunidade e inclui sistemas inteiros bem ligados.

Assim, a questão-chave que tem sido abordada é se a inovação tecnológica tem impacto na construção de uma cidade sustentável.

Este artigo fornece uma abordagem original que oferece uma discussão sobre o impacto das mudanças tecnológicas na construção de uma cidade sustentável. Além disso, um número substancial de referências são incluídas para indicar as pesquisas específicas para a análise deste tema. O trabalho é organizado da seguinte forma:

- A primeira seção está relacionada à inovação tecnológica. Esta seção abrange o panorama da inovação tecnológica e também a inovação nas mudanças tecnológicas.
- A segunda seção está relacionada à discussão de uma cidade sustentável. Esta seção abrange algumas questões relacionadas principalmente ao meio ambiente, social e economia.
- A terceira seção abrange o impacto da inovação tecnológica na construção de uma cidade sustentável.
- A seção final discute a conclusão e as limitações para futuras pesquisas.

## CONCLUSÃO

O mundo está passando por uma onda interminável de crescimento urbano. Até 2050, a população que vive nas cidades terá aumentado duas vezes. Uma das razões que levam a esse processo é porque uma cidade inteligente e sustentável se esforça para criar um ambiente de vida sustentável através do uso da tecnologia. A inovação tecnológica afetou a eficácia e proporcionou um futuro sustentável para o desenvolvimento da cidade. Assim, este artigo desempenha um papel crucial na análise do impacto da inovação tecnológica na construção de uma cidade sustentável.

A primeira análise constatou que a inovação tecnológica mudou a eficácia e a benevolência global no que diz respeito à sustentabilidade. Com o rápido crescimento de uma cidade, a inovação tecnológica mudou os padrões das pessoas. O uso da tecnologia levou a um desenvolvimento significativo da tecnologia de sexta geração. Há até uma relação entre pressão de legitimidade, rentabilidade e inovação verde. A inovação verde é uma abordagem importante para alcançar o desenvolvimento sustentável da cidade. Em segundo lugar, uma cidade sustentável cria um modo de vida duradouro em todo o meio ambiente, social e econômico. Existem vários aspectos para redefinir a relação entre cidade e meio ambiente. É importante formular estratégias, transformações, renovações e regenerações. Isso envolve a criação de uma cidade verde em termos de forma urbana, sistema de transporte e energia e recursos. Os aspectos sociais envolvem equidade, diversidade, qualidade de vida, democracia e governança e interconectamento. Enquanto isso, a economia contribui para a sustentabilidade e o funcionamento eficiente de uma cidade, especialmente os benefícios em um contexto econômico de benefícios individuais privados e benefícios de bens públicos. No geral, o impacto da inovação tecnológica tem impacto positivo na construção de uma cidade mais sustentável, especialmente em termos de meio ambiente, social e economia. Assim, as autoridades, especialmente o governo local e os urbanistas, não devem negligenciar a importância da inovação tecnológica.

No entanto, esta pesquisa tem algumas limitações. Em primeiro lugar, a elaboração deste artigo baseia-se no número de publicações. Assim, fica sem a coleta de dados primários. Em segundo lugar, a vida útil de cada estrutura ou modelo de cidade sustentável não é analisada. A mudança tecnológica está acelerando. O ritmo da inovação não está apenas acelerando ligeiramente, mas exponencialmente [71]. O problema é se as pessoas podem rivalizar com a velocidade da inovação tecnológica. Os avanços tecnológicos de inovação estão acelerando mais rápido do que as habilidades das pessoas para tentar adaptá-las e usá-las [72]. Além disso, a implementação do quadro ou modelo para uma cidade sustentável geralmente é mais focada em uma cidade específica, do que em todas as cidades. Adotar um modelo sustentável de outras cidades sem o molde guiado de uma cidade provavelmente está levando a um desastre. No entanto, é importante pensar globalmente, agir localmente.

Futuras pesquisas serão realizadas para a continuação deste estudo. Mais especificamente, são as relações causais que devem ser pesquisadas para medir a relação entre a influência da inovação tecnológica na construção de uma cidade sustentável (consulte Fig. 3). Há potenciais desconhecidos na inovação tecnológica, especialmente novas ideias, métodos e dispositivos para transformar uma cidade em direção à sustentabilidade. Assim, o desenho das propostas de pesquisa propostas é o seguinte:

- Proposição 1: A nova ideia de inovação tecnológica tem impacto na construção de uma cidade sustentável.
- Proposição 2: O método de inovação tecnológica tem impacto na construção de uma cidade sustentável.
- Proposição 3: O dispositivo de inovação tecnológica tem impacto na construção de uma cidade sustentável.

A pesquisa será baseada em pesquisa quantitativa, e uma cidade será escolhida. Assim, escolheremos Kuala Lumpur como nossa cidade de pesquisa. Como discutido por [73], Kuala Lumpur tem uma grande política e estrutura de cidades inteligentes. A Malásia, como um todo, é um país multi-racial, multi-religião e multicultural. Um dos desafios de uma cidade é a necessidade de garantir a sustentabilidade econômica, social e ambiental agora e no futuro de médio e longo prazo. Na última década, pesquisadores têm discutido a importância da sustentabilidade social dentro dos estudos urbanos [74]. A coleta de dados envolverá setores governamentais, especialmente prefeituras, moradores da cidade e setores empresariais.