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UNDERSTANDING THE PERCEPTION OF GREEN INFRASTRUCTURE IN ISKANDAR MALAYSIA

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Graphical abstract

Abstract

The deliberate development of green infrastructure, which includes blue and green networks in urban areas and residential areas in developing countries, is becoming more and more popular. These programs seek to create an ecological framework that, by storing CO2 and acting as a regional carbon sink in Malaysia, promotes social, economic, and environmental health. During this study, numerous experts from the public and private sectors were surveyed using questionnaires and interviews. Nevertheless, while undergoing urban development processes, cities in developing nations are unconsciously ignoring the advantages and values of green infrastructure. This study's main goal was to investigate the many uses and advantages of green infrastructure in Iskandar Malaysia. These advantages fall into three primary categories: economic, environmental, and social. Furthermore, the study sought to determine the degree of knowledge and comprehension of green infrastructure principles in Iskandar Malaysia. The study also found several obstacles preventing the best possible development of green infrastructure. These obstacles encompass Regulatory limitations, technical difficulties, contextual restrictions, structural problems, and behavioral or cultural barriers are some of these barriers. Six other barriers were also found by the research, including the following: budgetary and financial allocation issues, maintenance costs, disputes over who should be in charge of an agency or department, facility maintenance and enforcement, agency financial allocation issues, and the high implementation costs for developers. Recommendations include encouraging projects, maintaining reforestation policies, and collaborating between the public and private sectors on green infrastructure. Thus, to improve sustainable urban development and enhance green infrastructure, community and expert participation is necessary.

Keywords: Green Infrastructures, Values, Barriers, Sustainability and Reforestation.

1.0 INTRODUCTION

As urbanization accelerates and climate change intensifies, Green Infrastructure (GI) has become crucial in modern urban planning and designing. Further than just beautifying cities, GI offers fundamental solutions to manage stormwater, reduce heat islands, and improve public health. Not to mention, integrating green spaces and eco-friendly designs into urban environments is not merely an option but a pressing necessity for building resilient and sustainable cities in Malaysia.

Green infrastructure (GI) is the deliberate construction of green and blue spaces that is becoming more and more popular around the world thanks to programs like the European Commission's green infrastructure strategy. Moerover, green infrastructure (GI) was first implemented in the [29] as a reaction to pressures from urbanization, and it has since expanded to nations like Australia and the United Kingdom. Networks of natural and semi-natural areas make up the global ecosystem Green Infrastructure (GI), which is essential for sustaining biodiversity, ecosystem health, and ecosystem services [4].

In order to improve green infrastructure (GI), intentional steps must be taken, such as keeping an eye on already-existing green spaces, updating them to meet contemporary standards, and establishing new green areas where necessary [21]. Furthermore, this all-encompassing strategy is essential for solving urgent

environmental issues like pollution and soil erosion in addition to improving livability and protecting biodiversity. Green Infrastructure (GI) supports sustainable urban development by encouraging the integration of nature into urban settings, which strikes a balance between promoting social equity within communities, fostering economic growth, and preserving the environment [6].

Green Infrastructure's (GI)'s biodiversity contributes to several ecosystem services, including carbon sequestration, water purification, and climate change mitigation. In addition to fostering social cohesion, these green areas improve urban residents' quality of life and provide recreational opportunities. Properly cared-for green parks draw crowds, enhance cultural significance, and promote both physical and mental well-being. Furthermore, by raising property values and drawing capital for green infrastructure projects, Green Infrastructure (GI) promotes economic expansion. Its value in improving urban environments and promoting a higher standard of living for locals is demonstrated by its ability to reduce noise and provide calm areas, as demonstrated in locations like the National Park of athens [26]. Thereby, Green Infrastructure (GI) strategies must be put into practice for urban growth to be sustainable and to support global efforts to address environmental issues and advance holistic development.

As urban expansion replaces natural land with impermeable surfaces and contributes to climate change effects like flooding and the heat island effect, restoring green spaces is becoming more and more important for environmental preservation. Additionally, Green infrastructure (GI) provides a comprehensive approach to global environmental, economic, and social problems [7]. The construction industry has a substantial impact on greenhouse gas emissions, water use, waste generation, and habitat loss. For these reasons, it is imperative that sustainable practices like green building be adopted. Even though there are commercial obstacles, particularly in developing countries like Malaysia, Green Infrastructure (GI) offers a chance to incorporate nature into urban environments for a number of advantages. Mangrove forests and other Green Infrastructure (GI) are essential to the regulation of climate, conservation of biodiversity, and sequestration of carbon in Iskandar, Malaysia [32]. These ecosystems are threatened by land use changes and deforestation, which emphasizes the necessity of conservation efforts in Iskandar Malaysia.

Due to population growth and economic development, Iskandar is rapidly becoming more urbanized. This presents problems like rising land surface temperatures (LST) and shrinking green spaces [9]. In due course, research suggests that increasing the amount of green infrastructure can lessen these impacts by enhancing thermal comfort and lowering LST, which lowers the energy required for cooling and lessens the effects of climate change. For sustainable urban growth, environmental preservation, and human well-being in areas like Iskandar, Malaysia, development plans must prioritize green infrastructure. In urban settings, protecting and improving green spaces is essential for reducing climate change and maintaining biodiversity [8].

2.0 LITERATURE REVIEW

2.1 Conceptual Frameworks of Green Infrastructure

In regions such as Asia, Latin America, and Sub-Saharan Africa, urbanization has had a significant impact on biodiversity, natural systems, and ecosystem services (McDonald, 2013). This has resulted in a loss of farmland both inside and outside of cities as well as an uneven distribution of green space. In addition, future challenges are likely to worsen if green and blue spaces are not integrated into urban development, as recommended by Green Infrastructure (GI), [10]. Additionally, research and practice around the world, particularly in Asia, have focused a great deal of attention on specific kinds of green spaces, such as urban parks, gardens, and woodlands. Nevertheless, there is a lack of a thorough cross-environment plan that includes more green space on individual or shared property, agriculture, and remnants of natural areas [11].

Effective implementation is hampered by planners' inadequate grasp of the Green Infrastructure (GI) concept [14]. Because of improved administrative planning, larger, more developed cities like Kuala Lumpur, Johannesburg, Durban, and Bogotá have reported using strategic approaches to create urban green and blue spaces. Smaller cities, on the other hand, frequently lack information and plans for sustainable urban growth, underscoring the necessity for more thorough planning there.

2.2 Advantages, Significance and Objectives of Green Infrastructure

Los Angeles's Urban Green Infrastructure (UGI) research places a high priority on biodiversity preservation, risk reduction, and food production. [15] Highlight Urban Green Infrastructure (UGI's) function as a habitat and how it helps manage coastal and flood risks. Furthermore, although [16] noted that certain issues, such as air quality and environmental injustice, receive little attention, [17] concentrate on climate change adaptation in Latin American cities where Urban Green Infrastructure (UGI) strategies are incorporated into master plans and public policies.

According to du [19], only 38% of countries in Sub-Saharan Africa (SSA) have Urban Green Infrastructure (UGI) research, with South Africa leading the way. Temperature regulation is crucial when it comes to Urban Green Infrastructure (UGI), which mainly tackles urban issues like flood control and climate change [21]. Urban agriculture acts as a safety net for the reduction of poverty, and agricultural areas within Urban Green Infrastructure (UGI) guarantee food security [20]. Urban agriculture continues to play a significant role in SSA's food provisioning alongside urban foraging, despite certain challenges [6].

Enhancing public areas and offering recreational amenities are the goals of Urban Green Infrastructure (UGI) management [23]. On the other hand, an excessive focus on aesthetics could ignore the variety of Ecosystem Services (ES) provided by Urban Green Infrastructure (UGI) and impede indigenous innovations [35]. Acknowledging the wider advantages of Urban Green Infrastructure (UGI), particularly in terms of biodiversity preservation, is essential to enhancing human resilience and well-being, especially for marginalized groups [27].

[27] Highlight the importance of creating jobs in underprivileged areas, and King and [27] predicted that 17,000 Urban Green Infrastructure (UGI) maintenance jobs with high

yearly salaries would be created in South Africa's smaller cities. Johannesburg's green industry is experiencing job growth, according to [9]. Numerous studies, particularly from China, that concentrate on Urban Green Infrastructure (UGI) planning and decision-making, examine the broad objective of urban sustainability [31]. The three main environmental benefits, enhancing biodiversity, reducing pollution, and regulating temperature—have been extensively studied in China and India [25].

The importance of urban green spaces in enhancing thermal conditions is increasing due to rising urban heat islands and climate change [19]. While green roofs and vertical greening systems are researched for densely populated areas, street and park trees are essential for managing ecosystem services [33]. Chinese studies frequently use ideas like multifunctionality and continuity, utilizing the principles of landscape ecology to strive for "Ecological Security" [30]. In line with projects like the Sponge City project, Chinese research also explores blue-green infrastructure for flood protection [24]. Urban green spaces and sacred sites are essential to Asia's biodiversity conservation.

Despite evidence of beneficial effects such as stress reduction and improved social cohesion, research on the social and health impacts of Urban Green Infrastructure (UGI) is scarce in Asia [22]. Malaysia highlights how Urban Green Infrastructure (UGI) promotes social interaction and an active way of life. In India, public areas with trees, in particular, are used for cultural and community purposes [11]. While the economic benefits of Urban Green Infrastructure (UGI) receive less attention, environmental justice and social equity are becoming more and more the focus of Chinese research [34], [29] and [13] present economic analyses conducted in Kuala Lumpur and Guangzhou that highlight the effect of green spaces on property prices and the cost-effectiveness of Urban Green Infrastructure (UGI) in comparison to traditional engineering practices.

2.3 Primary Obstacles and Facilitating Elements of Green Infrastructure

Studies conducted in Latin America on green infrastructure (GI) pay little attention to planning and management tasks and instead concentrate on quantitative assessments of spatial organization, ecosystem service delivery, and integration into urban design [20]. Progress in this area is hampered by the absence of success metrics and stakeholder agreements. The term "Green Infrastructure (GI)" is underutilized in planning and management literature, which limits its potential benefits and makes it difficult to effectively incorporate into urban development [15]. Additionally, the creation of multifunctional solutions is hampered by the frequent lack of thorough consideration of various ecosystem services in public-sector Green Infrastructure (GI) plans [11].

Notwithstanding obstacles, new social actors supporting the development and maintenance of Green Infrastructure (GI) include NGOs and community organizations (Vásquez et al., 2017). Nevertheless, studies frequently ignore these initiatives, underscoring the necessity for a deeper scientific comprehension of their functions. Neoliberal policies in Latin America limit the use of urban planning tools, which creates obstacles to the development of Green Infrastructure (GI) [1]. The implementation of the Urban Green Infrastructure (UGI) may result in the displacement of vulnerable groups, and informal settlements face particular challenges such as the limited impact of planning regulations [9].

However, increasing public knowledge and agreement among interested parties helps to prioritize Urban Green Infrastructure (UGI) in official agendas [9]. According to Hersleund et al. (2018), outdated data in Sub-Saharan Africa (SSA) impedes strategic master planning, and limited Ecosystem Services (ES) mapping and valuation further limit Urban Green Infrastructure (UGI) deployment. Successful Urban Green Infrastructure (UGI) deployments in SSA, like those in Durban, South Africa, show the possibility for successful implementation despite obstacles [26]. In more detail, the integration of Urban Green Infrastructure (UGI) principles into SSA's urban planning processes can be accelerated through raising awareness and showcasing successful case studies.

Water, health, and disaster management are given top priority in municipal adaptation plans; Durban is acknowledged as a global leader in climate change preparedness. A key component of Durban's approach is community-based ecosystem adaptation [26]. Widespread awareness of Urban Green Infrastructure (UGI's) in Asia emphasizes ecosystem services over cultural and economic contributions. Limited public green space is a problem, particularly in places like Colombo, and integrating green networks in places like Kuala Lumpur presents challenges [18].

2.4 Green Infrastructure Policies in Iskandar Malaysia

Iskandar Malaysia has enacted green infrastructure-focused policies to counteract climate change and global warming, intending to lower carbon footprints and promote a green economy [8]. This strategic approach is consistent with the principles of sustainable growth, which underscore the critical importance of environmental conservation. In order to improve the general well-being of the region, protecting the green and blue infrastructure in Iskandar Malaysia has taken precedence [2]. By utilizing the benefits of green infrastructure, like temperature control and carbon sequestration, these policies not only preserve the environment but also help reduce energy use and greenhouse gas emissions [21].

Furthermore, [7] highlights the significance of integrating green and blue infrastructure for both Iskandar Malaysia and the wider Malaysian urban landscape. As noted by [8], two important components of this comprehensive strategy are the creation of green corridors and the preservation of mangrove forests. These initiatives show Iskandar Malaysia's dedication to maintaining the longevity of its greenery and biodiversity, as does the use of energy-efficient techniques, sustainable farming methods, and reforestation projects [12]. Such all-encompassing actions not only promote resilience and raise living standards, but they also support sustainability.

Moreover, the government's dedication to environmental preservation is demonstrated by the implementation of stringent regulations and the creation of monitoring systems [34]. Iskandar Malaysia seeks to create a sustainable urban development model that strikes a balance between environmental stewardship and economic growth by actively participating in conservation and reforestation initiatives [1]. These initiatives are part of a larger worldwide movement that acknowledges the indispensability of green infrastructure for creating resilient and livable urban environments [23].

3.0 RESEARCH METHODOLOGY

3.1 Study Area

Launched in 2006, the Iskandar Malaysia development initiative has come to represent one of Malaysia's most ambitious and revolutionary projects, bringing about a significant and swift change in the way land is used throughout its vast territory. Iskandar Malaysia is a large region that occupies 2216.3 km² and is located within the geographic coordinates of 1.4833° to 1.6667° north latitude and 103.4500° to 103.9094° east longitude, as shown in (Figure 1). This enormous area is twice the size of Hong Kong Island and more than three times larger than Singapore's landmass, indicating its enormous developmental potential and strategic importance in the region [32].

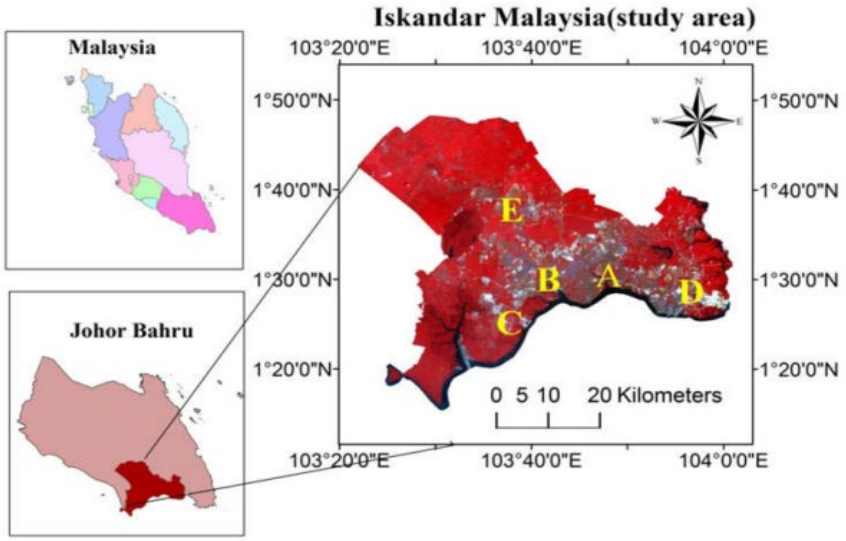

Figure 1. Iskandar Malaysia as seen from Landsat or the Right Panel Five Flagship Zones are Denoted as A-E, [32] and [16]

In addition, forecasts suggest that Iskandar Malaysia, also known as "IM," the country's second-largest metropolitan area, is set to become a serious contender amongst major East Asian cities, such as Singapore and Hong Kong, indicating its critical role in determining the economic landscape of the region. The establishment of Iskandar Malaysia in 2006, led by the Iskandar Regional Development Authority (IRDA), was a calculated move to draw in specific investments in a range of infrastructure and economic sectors, with the ultimate goal of promoting equitable and sustainable regional growth. The governance of Iskandar Malaysia is distinguished by the cooperative efforts of five local government organizations. Together, they carry out the policies and strategic initiatives listed in (Table 1), which creates five flagship zones for the development plan. At longest run, these zones play a pivotal role in augmenting pre-existing economic clusters and fostering nascent sectors, thereby substantially aiding the region's endeavors toward economic diversification and resilience-building.

3.2 Methodology

This section demonstrates how the goals and objectives of the study were met through the use of the research process and methods. This chapter provided an explanation of the research methodology and the steps involved in conducting the study. This chapter also covers the methods used to collect, handle, and analyze the data. This section also discusses who the research participants were for the questionnaire survey and how the study's objective was achieved using the data collected. The case study area's location, population, areas, and boundaries are all covered in detail in this chapter. A preliminary understanding, a review of the literature, data collection and analysis, results and findings, a conclusion, and recommendations are all part of this study. In the research's preliminary understanding phase, the history of the green infrastructure in the settlements is determined. After that, the problem statement was created, and the study's applicability was determined by the problem statement. Ultimately, the research's purpose, goal, and extent were established.

The second section of this study is the literature review, which contains all of the knowledge and data gathered from numerous textual sources. The purpose of the literature review was to understand the current state of knowledge regarding research challenges and to find out how other researchers have tackled problems that are similar to our own. The literature study covers the idea of green infrastructure, types of green infrastructure, benefits of green infrastructure in settlements, challenges, and supportive factors for green infrastructure in settlements. Data collection is the third phase in this study, and quantitative data collection based on primary data is the methodology used in this research. The primary data collection method has been expert perception. Data analysis, the fourth stage of this study, involved using the Excel program to assess the questionnaire results after the data was obtained. Additionally, the results and conclusions are given in tabular form using the Likert Scale mean score for easy comprehension. The research's fifth section, the conclusion and recommendation, offers a framework for improving Iskandar Malaysia's green infrastructure. It is based on the findings and results of the study. The objectives, data source, and methods of the study are enumerated in (Table 2).

Table 1 Five Flagship Zones in Iskandar Malaysia

FLAGSHIP ZONES:	AREA COVERED:	DEVELOPMENT:
A	City Center of Johor Bahru	The Causeway between Malaysia and Singapore, the New Financial District, the Central Business District, the seaside city of Danga Bay, and mixed development in Tebrau Plentong.
B	Nusajaya	Medini Iskandar Malaysia, a medical center, an "edacity," a resort for international tourists, an industrial logistic cluster, and a community are all located in the newly created Johor state.
C	Western Gate Construction	The Ramsar World Heritage Park, the Tanjung Piai, a free trade zone, and the Port of Tanjung Pelepas (PTP) offer a second transportation link between Malaysia and Singapore.
D	Eastern Gate Construction	Tanjung Langsat Port, Pasir Gudang Port and Industrial Zone, Tanjung Langsat Technology Park, and Kim Regional Distribution Center
E	Senai-Skudai	A multimodal center, the MSC Cyberport city, the Senai International Airport, and hubs for information and freight.

This study's initial phase is preliminary comprehension, during which the research's title is properly and pertinently discussed and evaluated. Preliminary understanding aims to ascertain the problem statement for this research project by defining the study's context. In essence, the context of green infrastructure in the settlement was ascertained by applying the previous knowledge. Additionally, to elucidate the importance and relevance of the upcoming study. Additionally, the investigation's scope was established using the preliminary knowledge; this phase of the research also establishes the aim and purpose of the study. The second section of this thesis is the literature review, which contains all of the data and knowledge gathered from numerous earlier investigations. See, for example, the sections from the literature review that discuss various forms of green infrastructure in Asia, including Bangladesh, Malaysia, China, India, and Sub-Saharan Africa, and Latin America, developed nations like the UK and Germany.

The preceding sections outline the primary purpose, principles, and objectives of Green Infrastructure (GI) in a variety of nations, including developed nations, Asia, and Africa. Additionally, the literature review's subsections discuss the advantages of ecosystem services. Lastly, parts of the literature review addressed the primary obstacles and supportive variables for Green Infrastructure (GI) in many nations, including Asia, Latin America, developed nations like the UK and Germany, and Sub-Saharan Africa. The concept of green infrastructure in the settlement, as well as its types, advantages, and values, as well as its difficulties and challenges, were established through the evaluation of these various articles. Afterward, the literature's main barriers and facilitators for green infrastructure were examined. Seven experts with a minimum of seven years' experience, from both the public and private sectors, were selected for the study using the purposive sample technique. They have worked for various agencies in the past. They have experience with development plans and the approval of planning applications for the private sector, and they have experience with applications for planning permission that involve residential development for the public sector. The third phase of this study is data collection; the methodology used for this study was quantitative data collection based on primary data.

Table 2 Links Between Research Objectives and Interviews Employed

RESEARCH OBJECTIVES:	NATURE OF INFORMATION NEEDED AND SOURCE:	RESEARCH METHOD(S) USED:
To identify available types of green infrastructures in the settlement of Iskandar Malaysia.	Primary data- from interviewing experts in the field.	Interviewed with Expert. Descriptive Analysis.
To examine the value and benefits of green infrastructure in Iskandar Malaysia.	Primary data- from interviewing experts in the field.	Interviewed with Expert. Descriptive Analysis.
To identify the main barriers and enabling factors for green infrastructure in the settlements, Iskandar Malaysia.	Primary data- from interviewing experts in the field.	Interviewed with Expert. Descriptive Analysis.

The primary data collection methodology has been based on expert perception. The first stage of gathering primary data is conducting a questionnaire survey with experts. They have been given and used survey questionnaires. to understand the opinions of specialists about the kinds, possibilities, advantages, and values of green infrastructure in Iskandar Malaysia, as well as the obstacles and supportive elements that surround it. The development of a questionnaire is essential to accomplishing the purpose of the study. The questionnaire for this study was developed using the data gathered from the literature review. Using a Likert scale, the availability, values, and enabling factors were ranked and given priority. A Likert scale rating is a psychometric response scale that is used in surveys to ascertain a respondent's preferences or degree of agreement or disagreement with a proposition, according to [3]. Participants are provided with options to express their feelings regarding a prepared statement using Likert scales. and to indicate how much they agree or disagree with a particular assertion using an ordinal scale [3].

A five-point Likert scale, as illustrated in (Table 3), is the most widely used kind. The points on the scale are strongly disagreed, agree, neutral, and disagree. To ensure the validity and reliability of the research, some researchers use the 7- and 9-point Likert scale, while others use the 3-point scale. The Likert scale variable is related to the study goal. Nonetheless, the 5-point Likert scale was used in this study since, according to [3], it is the most widely used rating system. In this study, the Likert Scale and questionnaire were employed.

The data for this study was compiled using primary data. For this study, a questionnaire survey was used to collect primary data. A questionnaire is a key component of data collection because it is a flexible tool that can be used to elicit a wide range of insights from respondents. Carefully crafted, it consists of a

sequence of questions specifically designed to disentangle the complex web of public attitudes, views, and reactions regarding a given topic. According to [6], the questionnaire represents a methodical approach that goes beyond simple questioning to fully comprehend the subtleties of human behavior, beliefs, and preferences. Any questionnaire's origins can be traced back to how well its goals are defined and how closely they align with the overall objectives of the research. Within the framework of this research, the development of the questionnaire represents a pivotal point that signals the shift from theoretical foundations to empirical investigation. The foundation is laid by the insights obtained from a thorough literature review, which also helps researchers define the scope, formulate questions, and improve the survey instrument so that it effectively captures the essence of the research domain.

Table 3 Likert Scale

LIKERT SCALE DESCRIPTION:	LIKERT SCALE:	LIKERT SCALE RANGE:	
Strongly Disagree	1	1- 1.80	Very Low
Disagree	2	1.90-2.60	Low
Neutral	3	2.70-3.40	Moderately High
Agree	4	3.50-4.20	High
Strongly Agree	5	4.30-5	Very High

The research questionnaire is implemented in four different domains, each with its specific meaning and objective. Similar to an opening prelude, Part A establishes the scene by exploring the respondents' demographic landscape and offers crucial background information for the analyses that follow. Section B delves into the perspectives of experts, revealing their observations and assessments regarding the various types of green infrastructure dotted throughout Iskandar Malaysia. In Part C, the focus is on perception and how these knowledgeable observers evaluate the perceived benefits and value of green infrastructure. Section D delves into the functional aspects, aiming to clarify the complex interactions between green infrastructure and the diverse ecosystem of Iskandar Malaysia. At last, Part E addresses the obstacles, exposing the hindrances that cast a shadow over the progress made in improving the green infrastructure in the area. This form serves as an illustrative visual aid to enhance the textual narrative by providing a thorough overview of the questionnaire used in this empirical odyssey.

Moreover, the study doesn't end with data collection; instead, it starts a new phase characterized by careful inspection and rigorous analysis. The process of converting unprocessed data into useful insights is known as data analysis, and it calls for a careful balancing act between methodological expertise and interpretive grace. Fundamentally, quantitative data analysis becomes the compass that leads researchers toward the illusive shores of understanding and enlightenment by navigating the complex web of numbers and statistics. This analytical journey, as advocated by [3], includes a variety of statistical methods, each designed to uncover the latent patterns, trends, and correlations that exist beneath the surface of empirical reality.

Within the field of data analysis, the questionnaire survey responses transform into a coherent narrative that presents the opinions of experts on green infrastructure in Iskandar Malaysia. Researchers carefully analyze quantitative data using programs like Microsoft Excel to create organized tabular displays. In addition to improving understanding, these visual aids also encourage discussion, acting as guiding lights amid the difficulties of interpreting data and promoting a deeper comprehension of the topic. This section of the study described the data collection procedures and the research methods used in this investigation. It also described the steps taken in the research process and the processing and analysis of the data. Aside from that, this chapter described the case study in detail and included information on the study's sample size and participants.

4.0 RESULTS AND FINDINGS

This study paper explains the conclusions and results that came from the thorough procedure of gathering and analyzing data. It includes understandings obtained from a review of the literature in addition to questionnaires using the Likert Scale.

4.1 Population Profile

A participant's demographic background is a complex tapestry of characteristics that provides important information about the makeup of survey respondents. It includes a wide range of elements, such as years of professional experience, job title, age, gender, marital status, and level of education. The respondent pool in this study consists of seven experts, with a gender distribution of 57 percent female and 43 percent male, indicating a balanced representation of both genders.

Upon closer inspection, the age distribution shows that the respondents are from a wide range of generational cohorts. Six age groups comprised the participants: 18–24, 25–34, 35–44, 45–54, 55–64, and those over 65. Remarkably, the majority of participants, or 57%, are between the ages of 35 and 44, suggesting a notable presence of middle-aged individuals in the sample. Furthermore, forty-three percent of the participants fall within the 45–54 age range, indicating a notable representation of individuals who are nearing the end of their careers. The participants' professional backgrounds contribute yet another level of intricacy to the demographic profile. With 57% of respondents working in the public sector and 43% in the private sector, a deliberate effort was made to guarantee diversity across the board in terms of employment sectors. Professionals from the public and private sectors have been purposefully included to enhance the dataset by offering a nuanced understanding of viewpoints from various organizational contexts.

The study also recognizes how critical it is to record participants' diverse professional experiences. The respondent pool was heterogeneous, as demonstrated by the individuals in (Table 4), who display a range of job titles and levels of expertise. In order to capture a wide range of insights and perspectives on the topic, the study includes participants with varying levels of experience, from beginners to seasoned professionals. In conclusion, the study's respondents' demographic makeup shows a conscious attempt to guarantee representation in a variety of contexts. The research aims to produce solid results that align with the complex nature of the research topic by integrating diversity in terms of age, gender, occupation, and experience. This inclusive approach not only improves the study's validity and reliability but also adds to the conversation about the topic of investigation.

4.2 Green Infrastructure

This section presents the conclusions and outcomes of the data gathered from an expert questionnaire survey. The findings' illustration comes from the opinions of both public and private experts on green infrastructure in Iskandar Malaysia. This chapter is divided into four sections as a result. This section is followed by a description of the respondents' demographic background to the questionnaire survey. Subsequently, it comprises the analysis and debate of the research results obtained from the specialists in green infrastructure in Iskandar Malaysia. In accordance with the three research objectives from Sub-sections, the discussion is further expanded in three sub-sections. This section concludes the paper's discussion of the study and all of the discussed issues.

The questionnaire study's primary conclusions cover a wide range of subjects pertaining to green infrastructure in Iskandar Malaysia. These include identifying the different types of green infrastructure that are currently in use, assessing their value and advantages, and investigating the obstacles and factors that either facilitate or obstruct their adoption in the region.

Table 4 Experts' Profiles

EXPERTS' PROFILES:			
Gender	Male (%)	Female (%)	
	43%	57%	
Age	35-44(%)	45-54(%)	
	57%	43%	
Agency	Public (%)	Private (%)	
	57%	43%	
Year of Experience	Less than 10 years (%)	10-20 years (%)	20-30%
	14%	43%	43%

4.3 The Significance and Advantages of Green Infrastructure in Iskandar Malaysia

According to (Table 5), all 15 criteria with mean score averages that reflected the value and benefits of green infrastructure in Iskandar Malaysia were acknowledged by the seven experts in their feedback. For instance, increasing local air quality emerged as the greatest value and benefit of Green Infrastructure (GI), with an average mean score of 4.57; on the other hand, attracting skilled workers to the region received the lowest value and benefit of Green Infrastructure (GI), with an average mean score of 3.43. however, with average scores of 4.57, 4.43, 4.43, 4.29, and 4.29, respectively, the mean score results show that the highest criteria of values and benefits of the green infrastructure are improving local air quality, improving people's physical health, flood mitigation, and stormwater management, attracting investment into the area, reducing overheating, and protecting the environment of Iskandar Malaysia.

It shows that there is broad agreement among experts regarding which of the aforementioned criteria has the greatest influence on Iskandar Malaysia in terms of advantages and values. This result is consistent with the Iskandar Malaysia policy, which states that green infrastructure reduces greenhouse gas emissions, acts as a carbon sink, sequesters and stores excess CO2 from the atmosphere, supports terrestrial and aquatic fauna, and moderates high temperatures through the use of lakes, large trees, and watercourses. Therefore, it is important to propagate and conserve the Green Infrastructure (GI) in Iskandar Malaysia, since [13] has confirmed that Johor's mangrove tree population declined by 20% between 1990 and 2010. Additionally, with a mean average score of 4.14, all the experts unanimously agreed that Iskandar Malaysia benefits from its green infrastructure in terms of biodiversity, connectivity with nature, and environmental protection.

This result is consistent with Iskandar Malaysia's policy for protecting mangrove forests as a natural defense against powerful winds, waves, and tsunamis, as well as to prevent soil erosion and mitigate and sequester floods. This finding thus initiates the policy. In addition, the experts recognized the importance of Green Infrastructure (GI) in IM for maintaining tourism, promoting active travel, enhancing social cohesion, and fostering both public and private cost savings—all of which received mean scores of 4.00.

These results are consistent with Iskandar Malaysia's strategic pillars on green infrastructure (GI), which aim to create smart cities by integrating the economy, environment, and social principles. The six factors that make up a smart city are (1) smart economy; (2) smart governance; (3) smart environment; (4) smart mobility; (5) smart people; and (6) smart living. As a result, Green Infrastructure (GI) draws investors in addition to offering a solution to the flood tragedy. Finally, it is discovered that while a small percentage of experts concur that Green Infrastructure (GI) brings in highly skilled workers to Iskandar, Malaysia, the majority are unsure and remain neutral, with a moderately high mean score. Thus, it would appear from this data that the value and benefits of Green Infrastructure (GI) are less important in luring qualified workers into IM. In the event that not, more and more experts on this topic need to be surveyed.

4.4 Obstacles Towards Improving Green Infrastructure

It is discovered that experts have divergent views on every major obstacle to enhancing green infrastructure in Iskandar Malaysia, as shown in (Table 6). Among the barriers enhancing Green Infrastructure (GI) in IM, the regulatory barrier initially showed the highest mean score (3.29). Technical and contextual barriers came next, with mean scores of 3.14 and 3.00, respectively. As a result, the mean score for structural barriers and cultural/behavioral barriers was 2.86, which was the same. Therefore, the results suggest that most respondents agreed that technical, contextual, and regulatory policies are important barriers to influencing the Green Infrastructure (GI) in Iskandar Malaysia.

Table 5 Values and Benefits of Green Infrastructure in Iskandar Malaysia

CATEGORY:	VALUE AND BENEFIT OF GI:	NUMBER OF EXPERTS: 1	2	3	4	5	6	7	MEAN SCORE:
Social Value	Provide Goods and Products	4	4	4	2	4	4	4	3.71
	Improvements to People's Physical Health	5	4	5	4	5	4	4	4.43
	Improvements to People's Mental Health	4	4	5	1	5	4	4	3.86
	Encouraging Active Travel	4	4	5	4	4	4	3	4
	Improving Social Cohesion	4	4	5	4	3	4	4	4
	Increasing Connectivity for People and Nature	4	4	5	4	4	4	4	4.14
Environmental Value	Reducing Overheating in Urban Areas	5	4	5	2	5	5	4	4.29
	Increasing Biodiversity	4	4	5	4	4	4	4	4.14
	Improving Local Air Quality	5	4	5	4	5	4	5	4.57
	Protecting The Environment	5	4	5	4	4	3	4	4.14
	Flood Mitigation and Storm Water Management	4	4	5	5	4	5	4	4.43
Economic Value	Attracting Investment into The Area	4	4	5	5	4	5	4	4.43
	Private And Public Cost Savings	5	4	4	4	4	4	3	4
	Attracting Skilled Workers to The Area	4	4	3	3	3	4	3	3.43
	Increasing or Sustaining Tourism	4	4	5	4	4	3	4	4

Furthermore, the results show that improperly defined regulations related to policies will significantly hinder the advancement of Green Infrastructure (GI) in IM. Therefore, this result aligns with Iskandar Malaysia's objective to implement policies and guidelines pertaining to the presence of green space in IM. Furthermore, it was discovered that experts highly recognize contextual factors and technical implementation issues as barriers to enhancing green infrastructure. Finally, it was found that in Iskandar Malaysia, structural, cultural, and behavioral barriers were regarded as average barriers to Green Infrastructure (GI). Thus, it follows that culture has an impact on Green Infrastructure (GI) conservation in cities like Iskandar, Malaysia. An overview of the different kinds of barriers are as follows:

- Structural Barriers: Difficulties brought about by the unique arrangements and methods of institutions and organizations. Consequently, these practices can influence new initiatives by affecting the way these organizations function and how they establish and achieve their objectives.
- Regulatory Barriers: Difficulties brought about by the means by which an organization or government monitors and controls the actions of its constituents and the laws they follow.
- Cultural and behavioral barriers: The impact resulting from the dispositions, customs, mindsets, and convictions of individuals occupying significant roles in an establishment.
- Contextual Barriers: Difficulties and focal points resulting from external factors that a government or organization needs to address.
- Technical Barriers: These are functional or structural impediments that delay or prohibit the development of green infrastructure.

4.5 Experts' Perspectives on Extra Hindrances and Facilitating Factors

The analysis conducted by the expert revealed numerous additional obstacles that are impeding the development of green infrastructure in Iskandar Malaysia. Financial limitations are a major concern, as inadequate budgetary allocations hinder the implementation of sustainable initiatives and impede progress. One of the biggest challenges is maintenance costs, which put a heavy burden on stakeholders and put a strain on available resources. Complicating matters further is the complex governance environment, which gives rise to disputes over which departments or lead agencies should be in charge of maintenance and enforcement. This ambiguity creates concerns about accountability in the infrastructure development process and makes effective stewardship more difficult.

Table 6 Barriers to Green Infrastructure in Iskandar Malaysia

BARRIERS:	NUMBER OF EXPERTS: 1	2	3	4	5	6	7	MEAN SCORE:
Structural Barriers	4	2	3	4	3	3	1	2.86
Regulatory Barriers	4	2	4	5	4	3	1	3.29
Cultural/Behavioral Barriers	4	2	4	4	2	3	1	2.86
Contextual Barriers	3	2	3	4	3	3	3	3
Technical Barriers	4	2	2	4	4	3	3	3.14

Moreover, the problem of financial distribution exacerbates the current obstacles, as organizations compete for scarce resources amid conflicting agendas. This scarcity further impedes progress because it frequently results in astronomical costs for developers looking to implement green solutions. Overcoming these challenges calls for an all-encompassing strategy that includes stakeholder collaboration, simplified governance structures, and strategic financial planning. Iskandar Malaysia can overcome these obstacles by encouraging cooperation and creativity, realizing the full potential of its green infrastructure projects, and clearing the path for environmentally responsible growth and sustainable development in the area. Besides, to address the obstacles found, the specialists presented a detailed plan for integrating green infrastructure in Iskandar Malaysia. This plan calls for a multifaceted strategy that starts with fostering collaboration between the public and private sectors. The implementation of sustainable infrastructure projects can be

expedited by leveraging the strengths and resources of both sectors through partnerships and collaboration. This approach can overcome financial constraints, streamline processes, and stimulate innovation.

The experts also emphasized how critical it is to spread knowledge about green infrastructure in Iskandar Malaysia. Stakeholders can be empowered to adopt eco-friendly practices by means of focused educational campaigns, outreach programs, and community engagement initiatives. Awareness campaigns can spark broad support for green initiatives by fostering a culture of environmental stewardship and responsibility. This can motivate people and organizations to incorporate sustainability into their daily operations and decision-making processes. These tactics provide a route towards a more resilient and sustainable future for Iskandar Malaysia, where green infrastructure is the cornerstone of growth and prosperity when coupled with visionary leadership and a dedication to change.

5.0 DISCUSSIONS

Starting with, Chinese studies as an exemplar, often target "ecological security" and make use of notions such as continuity and multi-functionality, in addition to landscape ecology principles like the patch-corridor-matrix [30]. Furthermore, Asian studies found that maintaining biodiversity requires both urban green spaces like parks, gardens, campuses, and greenways, as well as sacred locations like cemeteries and temples [24]. The use of remaining forests for environmental factors (Foo, 2016), the reduction of stress caused by park visits [22], and the promotion of physical activity and social cohesion through local green spaces [22] are just a few examples of how Green Infrastructure (GI) research in Asia demonstrates beneficial health effects.

This study, which came in first, outlined 15 advantages and values of green infrastructure in Iskandar Malaysia. From highest to lowest value and benefit, the identified 15 green infrastructures include: (1) improving local air quality; (2) enhancing people's physical health; (3) mitigating floods and stormwater management; and (5) drawing investment to the area. (5) lessening overheating, (6) boosting biodiversity, (7) fostering connectivity between humans and the natural world, (8) safeguarding the environment, (9) maintaining tourism, (10) promoting active travel, (11) enhancing social cohesion, (12) saving money for the public and private sectors, (13) enhancing people's mental health, (14) offering goods and products, and (15) drawing in skilled labor. Additionally, this study states that in terms of value and benefits, flood mitigation and stormwater management have the highest significance rates in Iskandar Malaysia. Then comes the immediate improvement of biodiversity and control of temperature. However, it is confirmed that Green Infrastructure (GI) in Iskandar Malaysia is not as important in terms of encouraging the creation of more jobs in the city of IM.

Similar to this, the majority of research on urban green infrastructure in Sub-Saharan Africa (SSA) also emphasizes reducing heat temperature control as a means of addressing climate change, which is acknowledged as a critical objective of Urban Green Infrastructure (UGI) [21]. Similarly, China and India have highlighted the environmental benefits of Urban Green Infrastructure (UGI), which include improving biodiversity, controlling pollutants, and regulating temperature [31], Kotharker et al. 2019). In addition, flooding has been caused by urbanization in flood-prone areas of the SSA cities, such as riverbanks, floodplains, and wetlands, and drainage issues are also taken into account. In summary, this study confirms that there are five main barriers to improving green infrastructure in Iskandar Malaysia: (1) regulatory; (2) technical; (3) contextual; (4) structural; and (5) culture/behavior. The highest standard of impediments to enhancing green infrastructure is found to be regulatory policies. Then came the contextual and technical barrier right after.

The benefits of urban green infrastructure for city dwellers include environmental management through regulatory services. [12] For instance, states that Bangalore's green spaces contribute to improved air quality by reducing pollutants and suspended particulate matter, which in turn lowers the city's overall temperature by 3 to 5 degrees Celsius [12], [28]. Similarly, the mapping project of Addis Ababa's residential urban morphological types (UMT) through regulatory services offers an additional illustration of microclimatic management [5].

One finding of the study, which may be specific to Addis Ababa, is that "green building composition and proportions were higher in settlements and traditional dwelling areas than in other residential areas, and are consequently linked with the lowest predicted land surface temperatures" (ibid.:54). Communities with green spaces benefit from the cooling effect that these areas provide for the residents. Furthermore, it was observed that Dakar (Bangladesh) communities typically used plants or roof canopies to reduce heat exposure, illustrating the ability of green spaces to moderate temperature (Jabeen et al., 2010: 429). However, there are still barriers related to culture and structure that prevent Iskandar Malaysia from developing its green infrastructure. This study thoroughly examined six additional barriers that will raise IM's Green Infrastructure (GI). These extra obstacles include (1) financial/budget allocation; (2) maintenance costs; (3) disputes over who should be the lead agency or department; (4) facility maintenance and enforcement; (5) the issue of agency financial allocation; and (6) the high cost of implementation for developers.

6.0 CONCLUSION

A wide range of 15 values and advantages linked to green infrastructure were found in the Iskandar Malaysia study. Among these are the observable benefits like local air quality improvements, which have a positive direct impact on people's physical health. Furthermore, green infrastructure is critical for stormwater management and flood mitigation, both of which are vital in an area vulnerable to these types of natural disasters. It also acts as a catalyst to draw investments, supporting initiatives for sustainability and economic growth. Additionally, green infrastructure promotes environmental resilience and improves inhabitants' quality of life overall by lowering overheating and boosting biodiversity. Another important advantage is connectivity, which is beneficial not only for creating physical links between humans and the natural world but also for promoting a feeling of community and environmental care. It provides a forum for encouraging active travel, which lessens reliance on motorized transportation and lessens related environmental effects. Green infrastructure also improves people's mental health in the community by promoting social cohesion and offering recreational opportunities. Moreover, it promotes cost savings for the public and private sectors by providing natural solutions to a

range of issues like erosion control and the mitigation of the urban heat island effect for better performance.

The study identifies a number of obstacles to the development of green infrastructure in Iskandar Malaysia, despite the clear advantages. Regulatory obstacles, technological difficulties, contextual restrictions, structural limitations, and cultural and behavioral variables are a few of these. For green infrastructure projects to be implemented and maintained successfully, these obstacles must be removed. In light of this, the study emphasizes how crucial it is for the public and private sectors to work together under the direction and encouragement of governmental initiatives and policies. It underlines how important it is to coordinate land acquisition, forest planting, and conservation initiatives in order to preserve already existing green areas and expand Iskandar Malaysia's network of green corridors.

The study's conclusions highlight how urgently Iskandar Malaysia needs to take action to protect and develop its green infrastructure. There is a chance that green spaces will continue to deteriorate as development and population growth continue, aggravating environmental problems and endangering the health of locals. A roadmap for putting green infrastructure into practice is thought to be crucial for directing targeted interventions and guaranteeing sustainability over the long run. Prioritizing cooperation, involving stakeholders, and taking proactive steps to purchase land for forest plantations and conservation should be the top priorities of this blueprint. Iskandar Malaysia can create a future for its people that is more resilient, sustainable, and livable by utilizing the many advantages of green infrastructure.

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Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper

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