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This journal gathers publications from surveying practices namely Quantity Surveying, Property Surveying, Geomatics and Land Surveying and Building Surveying. The publication of ISrJ gives opportunity to the researchers, academicians, practitioners as well as students to share their research outcomes. We have covered many topics in the last few volumes under the current editorial but there is still a vast area within these surveying practices waiting to be explored.

JOURNAL OBJECTIVES

International Surveying Research Journal (ISrJ) is an international journal dedicated to the publication of theoretical and empirical refereed articles, case studies or critical literature review in thefield of surveying research and development.

The scope of the journal covers development and application of the surveying practices globally. The purpose of the **International Surveying Research Journal (ISrJ)**:

- To provide a unique international forum for new research findings in the surveying research.
- To reflects recent development and application of surveying practices.
- To encourage knowledge sharing among researchers, academics, and practitioners.
- To keep abreast with new technology developments in the surveying fields.
- To stimulate research in the various surveying disciplines.

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Editor's Message





Welcome to International Surveyors Journal (ISrJ) Vol. 13, Issue No. 3 for May 2024 for the Royal Institution of Surveyors Malaysia (RISM). This journal gathers publications from surveying practices namely Quantity Surveying, Property Surveying, Geomatics and Land Surveying and Building Surveying. The publication of ISrJ gives opportunity to the researchers, academicians, practitioners as well as students to share their research outcomes. We have covered many topics in the last few volumes under the current editorial but there is still a vast area within these surveying practices waiting to be explored. This particular issue consists of four (4) selected papers and one (1) paper from winner of the Best Potential Research Award, 16th International Surveying Conference for Undergraduates 2024. The papers has been reviewed by the editorial committee and international experts on current topics which include Main Issues In Quantity Surveying Education, Students' Perception In Reducing Carbon Emission Using Bike-Sharing System Within The Campus: Malaysian University, The Importance of The Lease Extension Premium Calculation Formulae For A Landed Residential Property, Low Participation of Local Skilled Workers In Malaysian Construction Industry: Time For Improvement and The Role of Valuers in Leveraging Big Data In Real Estate Industry in Malaysia. We wish to extend our appreciation to all our contributors who have sent articles to date and we will try to include in future issues of ISrJ.

Do drop a message and request if there are specific surveying topics of particular interest. Thank you for the readership and hope it is beneficial to all.

Sr Hj. Ahmad Suhaimi Abdul Majid Advisory Editor, May 2024

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MAIN ISSUES IN QUANTITY SURVEYING EDUCATION

Atikah Binti Razali, Assoc. Prof. Dr Suhailah Binti Hussien, Assoc. Prof. Dr. Tunku Badariah Binti Tunku Ahmad, Assoc. Prof. Dr Mohd Burhan Bin Ibrahim

Abstract

This study gives an overview of the literature on Quantity Surveying (QS) Education issues. QS education is the platform for producing highly qualified and skilled Quantity Surveyors for the Malaysian construction sector. As time passes, the quantity of QS graduates generated grows, making companies selective. This phenomenon might contribute to a recent complaint that the performance of QS graduates did not match the employer's expectations, and some prior studies from the QS education provider have started. However, the research assessing the performance of current QS graduates related to their QS education is very limited. Therefore, this research is to investigate issues in QS education that contribute to the quality of QS products. The findings show that there are four main issues in QS education, which are quality, technology, curriculum, and pedagogy used in QS education. The issues discovered will create awareness for the QS education providers in providing the programme that not only meets the employers' needs but also needs to consider the characteristics of today's students as well as the challenges of educator expertise.

Keywords: Quantity Surveying education, quality QS education, technology QS education, Curriculum QS education, Pedagogy QS education.

1.0 Introduction

Quantity Surveying (QS) Education has evolved and emerged since the program was offered to suit the needs of industry. Even though the QS profession was established as earlier as 1875 and it has been practiced for almost 150 years period of time, however, the history of QS education before the 1930s was least in written and not much information can be gained. With minimal information about QS education before 1930s, there is no proper curriculum structure offered and the Quantity Surveyor was trained and guided as an articled pupil scheme in which the QS recruited as staff and trained to be a QS. From the 1930s until 1960s, the QS program was offered at the technical college (Seeley and Winfield, 1999). According to Seeley and Winfield (1999), the introduction of QS in degree programs in the universities began in late 1960s and early 1970s. The first transformation of QS education was in the mid 1980s and mid 1990s due to the growth in numbers of students, changes in the content and structure of courses and upgrading from polytechnics to universities. At this time, the increased numbers of students are not due to demand by employers but due to increased allocation of resources in higher education which makes employers become more selective and demanding when recruiting graduates (Seeley and Winfield, 1999). Over the decades the pattern of QS education needs to be changed to ensure competitive quality of QS graduates globally as well as meeting the expectations of people in the industry (Teichler, 1988).

Since there has been very little study on the issues in QS education since a decade ago, this study will explore the issues. Some of the issues, such as the development of sophisticated technology since 1995, have created trending technology issues for QS educational providers globally in tandem to meet the industry's needs. Moreover, there was also an issue with the quality of QS graduates, which was found to be unsatisfactory (Yogeshwaran, Perera, and Ariyachandra, 2018). Furthermore, the rapid growth of technology created issues about the need to push QS education to shift from traditional to modern education, particularly due to the impact of COVID-19, which switched the education landscape from face-to-face to online platforms of study. In addition, millennial student attitudes may be one of the issues that QS educators should take care of since they may affect QS graduate performance (Nimon, 2007; Szabo 2021). Another essential issue is that the difficulties experienced by QS educators may become one of the factors influencing QS graduate success (Rahmat, 2016). Many more other issues, such as providing interactive teaching (Lee, 2013), appropriate curriculum design (Odubiyi, 2019), and appropriate assessment for tasks given (Kamardeen, 2015), may also need to be explored and systematically managed.

This shows that there is a need to explore the fundamental issues of QS education, at least from a decade ago (Teichler, 1988), since very little has been studied in this area. In fact, it is

very essential to discover the root issues that QS education should focus on in order to conduct further studies detailing the main issues discovered. Therefore, this paper intends to explore the issues of QS education for a decade that can further be the focus of the educational providers for QS programmes.

2.0 Methodology

The best research method applied for the study is a literature review of previous studies done by previous authors in the form of written texts such as journal articles and conference papers. The time frames of the selected resources fall within the years 2012–2022, about a decade of QS education. Total literature sources were forty-seven, but only thirty-seven within the time period of 2012–2022, as shown in Figure 1. The method of data analysis used is inductive content analysis, which involved analysing a large number of texts into coding, grouping, and developing specific themes (Elo and Kygnas, 2007; Muthiah, 2020; Graneheim, 2017).

3.0 Literature Review

This research employed a comprehensive review of the literature, which provided a systematic, clear, thorough, and reproducible approach for finding, analysing, and synthesising the current body of finished and documented work done by researchers, academics, and practitioners (Neuman, 2003; Fink, 2005). It collected the efforts of previous researchers on the issues of QS education that occurred from 2012 until 2022—the combined efforts of several researchers who distribute knowledge and enable community members to learn (Neuman, 2003). It should not be mentioned, but the researcher found very little written concern about the issue of QS education, particularly in Malaysia. Table 1 shows the related journals reviewed for this study.

4.0 Literature Study

This review followed Neuman's (2003) steps for conducting the study. The first step was clearly defined and well-focused on the objectives of the study, which were to explore the issues of QS education. The second step was designing a research strategy, which is the planning of the research strategy, such as the materials to be referred to, the time allocation for the sources, where to collect the sources, and how to record the information collected. The third step was to locate a research report in which the data collected for this study was from search engines such as Google Scholar, the Dar-Al Hikmah Library databases of International Islamic University Malaysia (IIUM), such as articles in scholarly journals, conference proceedings, and the website of the Board of Quantity Surveyor Malaysia (BQSM). About forty-seven articles were collected for the study, of which 65% (31) were scholarly journal articles and 35% (16) were conference proceedings. Figure 1 shows the distribution of the

reading sources within the stipulated time frame of 2000–2022. It has been discovered that very little was written about the issues in QS education in the early 2000s, but the number of articles about QS education has begun to increase since 2016. The dotted line shows the issues in QS education within a decade, which is the focus of this study.



Figure 1 Distribution of reading sources from 2000 - 2022

The fourth step of the reviews was to record and organise the collected sources in the form of a tabulation of essential information such as the authors' names, year of publication, and any comprehensive data related to the study, including columns for coding and generating main ideas such as in Tables 1–5. The last step was to write the reviews critically based on the themes generated from the tabulation.

5.0 Inductive Content Analysis; Study Coding and Generating themes

This study implemented inductive content analysis, wherein the themes were manually generated from unifying groups of words during categorising processes (Graneheim, Lindgren, and Lundman, 2017). The process of inductive content analysis was modified from both Neuman (2003) and Elo and Kygnas (2007), in which it involved study coding and generating themes. The purpose of coding in this study was to create categories that were further to be generated as main themes (Muthiah, 2020). The coding categories were groups of words with similar meanings or connotations, and the processes were carried out by categorising similar groups of words that unify under specific generated themes, as shown in Table 1. Based on Table 1, there are four main issues in QS education, namely issues of quality in QS education, issues of curriculum in QS education, issues of technology in education, and issues of pedagogy used in QS education.

NO	AUTHORS	CATEGORIES / ASPECTS	THEMES/
			MAIN ISSUES
1	Zolkafli@Zulkifli (2013),	Not achieved Standard and	QUALITY OF
	Shafie (2014), Dada and	competencies by the employers	QS
	Jagboro (2017), Yusop	• Lacking of graduates' soft skills	EDUCATION
	(2018), Yogeshwaran,	and attitude	
	Perera, and Ariyachandra,	• Input of practitioner in teaching	
	2018; Kibwami (2021)	and learning	
		Educational training for	
		competencies level, professional	
		capabilities, and professional	
		development	
		• Technical skills of QS graduates	
		• Low performance of graduates	
2	Ayinde and Samuel	Curriculum re-adjustment	CURRICULUM
	(2018), Ochieng, Jones	 Improve students learning 	OF QS
	and Jiles (2018), Odubiyi,	outcomes	EDUCATION
	(2019), Mahdzir (2021),	Assessment preference by	
	Ekundayo, Shelbourn,		
	and Babatunde (2021),	Develop the requisite knowledge	
	Yap, Hew, and Skitmore	and skills to work	
	(2022)	• Attributes that influence student	
		learning	
3	Kim (2012), Lee (2013),	• Learning tool – BIM, VR, and	TECHNOLOGY
	Mitchell (2014), Ali,	Hologram	OF QS
	(2016), Wong, (2018),	• Video and interactive PowerPoint	EDUCATION
	Mohamed (2018), Wang,	Learning aid	
	Li, and Kho (2018),	Virtual learning environment	
	Senaratne, and Rodrigo	(VLE)	
	(2019), Ojo (2019),	• MOOCs	
	Babatunde and Ekundayo	Teaching Measurement Courses	
	(2019), Yap and Aziz	by new format with the	
	(2020), Wang (2020),	integration of computer software	
	Ekundayo (2020),		

Table 1 Categories and generating themes for Issues in QS educa	tion
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	Kamardeen and	DigiExplanation driven	
	Samaratunga (2020),	assessment	
	Mojtahedi (2020), Tayeh	• Learning management system,	
	and Issa (2020), Ullah,	• Adoption of e-learning approach	
	(2020), Kibwami (2021),	to teach Measurement Courses	
	Palis, Kui, and Yee		
	(2022), Dithebe, (2022)		
4	Kamardeen (2015), Lee,	• pedagogical model of critically	PEDAGOGY IN
	Lee, and Kovel (2016),	reflective practice	QS
	Tunji-Olayeni (2016),	Teaching and learning	EDUCATION
	Abdul Majid (2017),	Instructional model/pedagogies	
	Kamarazaly (2020),	Learning difficulties/challenges	
	Gurmu and Mahmood	OKU with slow learning ability	
	(2020), Gurmu,	Students' learning style	
	Kamardeen, and	Blended learning	
	Mahmood (2021)	Online platform	
		Flipped classroom	
1			1

6.0 Findings and Discussions

Based on the findings, there are four main issues in QS education that have been raised throughout the past decade (2012–2022). The issues in QS education stem from the elements of quality, curriculum, technology, and pedagogy. Figure 2 shows clearly the trend and pattern of issues in QS education. It is uncertain why there is less interest in writing papers pertaining to QS education issues. However, interest in research for QS education has started to grow since a decade ago, but only on a few elements of QS education. In the year 2018, the initial starts of more elements were covered, and all four main issues were raised by the previous researcher in 2021. This can be considered a sign to make some changes and reshape the QS education landscape. However, there should be more writing to detail each of the four main issues that have been highlighted by the previous researchers, which this study will discuss further.



Figure 2 Trend and pattern of the issues in QS education

7.0 The issues of Quality in QS Education

According to Cheng and Tam (1997), the potential issues of education quality can be from various aspects such as the processes, outputs, and inputs to the educational systems, as well as the significant features of management quality and the attainment of education quality. Based on Table 2 there are two aspects of issues of quality in QS education which are the 'outputs' and 'inputs to the educational systems'. The outputs refer to the quality of products produced by QS HEP which are the QS graduates. There is criticism on quality and competency of the QS graduates which do not achieve standard and competencies by the employers (Shafie, 2014; Yogeshwaran, Perera, and Ariyachandra, 2018). Most of the complaints arose on the skills of the QS graduates. They claimed that the QS graduates are lacking technical skills, soft skills, communication skills, problem solving skills, interpersonal skills, professional life-long learning skills and technical skills such as quantification skills (Shafie, 2014; Yusop, 2018).

Table 2 Issues of Quality in QS Education

ASPECTS	QUALITY	AUTHORS
Outputs	Not achieved Standard and competencies	Shafie (2014);
	by the employers	Yogeshwaran (2018)
	Lacking of graduates' soft skills,	Shafie (2014)
	communication skills, problem solving	
	skills and interpersonal skills, professional	
	life-long learning skills	
	Potential Lacking of Quantification, and	Yusop (2018);
	Technical skills of QS graduates	
	Less resilient, unlikely to stay with one	Szabo (2021)
	employer for long, having short attention	
	span, their attitudes on time is "24/7"	
	world, less to be punctual than previous	
	generation, not concern with authenticity	
	of the information that they get from the	
	internet, and less rely on other opinions in	
	making decision	
Inputs to the	The need of input of practitioner in	Zolkafli@Zulkifli (2013),
educational	teaching and learning	Kibwami (2021)
systems	The need of educational training for	Dada and Jagboro
	competencies level, professional	(2017); Kibwami (2021)
	capabilities and professional	
	development	
	Lecturers agreed on challenges in	Rahmat (2016)
	teaching measurement courses.	

Another quality issue in QS education may be the attitude of the millennial generation. Szabo et al. (2021) have come across the characteristics of the millennial generation: being less resilient, unlikely to stay with one employer for long, having a short attention span, their attitudes on time in a "24/7" world, being less punctual, not concerned with the authenticity of the information that they get from the internet, and less relying on other opinions in making decisions. These attitudes may compromise the quality of a QS graduate. The attitude of the QS students that will become QS graduates should be a concern, as most employers are concerned with the resilience of their employees (Yusof , 2018; Yap, Hew, and Skitmore, 2021). On the other hand, inputs to the QS educational systems are one of the issues in QS

education. The inputs refer to the competencies, professional capabilities, and professional development of the educator, including their challenges. For instance, Dada and Jagboro (2017) and Kibwami (2021) mentioned that practical training may provide professional capabilities, professional development, and educational practicality in the real world. In spite of this, Mui (2006) have suggested that, in order to overcome or reduce the quality gap among QS graduates in meeting construction needs, firms should work closely with universities to ensure the desired competence level to be achieved in new QS graduates.

In a nutshell, the quality of QS education has improved over the past decade. However, the issues of quality in QS education should have been updated from time to time, particularly on the quality of QS graduates and the quality of the lecturers in QS HEP. Therefore, more research and concern should be focused on aspects of the soft and technical skills, and attitude of QS graduates and the professionalism and challenges of the QS lecturer.

8.0 The issues of Curriculum in QS Education

Curriculum refers to a set of courses and their content that is taught at a university, as well as the sequence of events and experiences that help students develop into responsible and independent individuals (Awang, 2014). It describes all of the accessible teaching, learning, and assessment resources for a particular course of study (Awang, 2014). Based on Ornstein and Hunkins (2014), the major components of curriculum design consist of subject matter or content, instructional methods and materials, and learners' experiences or activities. Table 3 shows that there are five aspects discovered as issues in curriculum in QS education, including course content, learning objectives, design of the curriculum, students learning outcomes, and assessment.

ASPECTS	CURRICULUM	AUTHORS
course content	Inappropriate curriculum	Odubiyi (2019)
	and course content	
	QS BIM educational	Ali (2016), Babatunde and Ekundayo
	framework	(2019), Palis (2022), Dithebe (2022)
Learning	Relevant Bloom's	Shafie (2014)
Objectives	taxonomy in QS degree	
	program	

Table 3 Issues of Curriculum in QS education

	Develop the requisite	Ekundayo, (2021),	
	knowledge and skills to		
	work		
	Attributes	Yap (2022)	
Curriculum design	Curriculum re-adjustment	Ayinde and Samuel (2018), Wang,	
		(2020), Kibwami (2021)	
Students' learning	Improve students learning	Wao (2018),	
outcome	outcomes		
Assessment	Assessment preference by	Mahdzir (2021),	
	students		

Odubiyi (2019) have raised concerns about the inappropriate curriculum and course contents provided by the QS HEP, which stem from the claims of the employers about the competency and skills of QS graduates. Moreover, Ali (2016), Babatunde (2019), Palis (2022), and Dithebe (2022) suggested BIM should be included in the course content of the QS programme. Learning objectives are another issue in the curriculum of QS education such as to develop the requisite knowledge, skills, and attributes to work by applying relevant Bloom's taxonomies (Shafie, 2014; Ekundayo, 2021; Yap, 2022). Moreover, Ayinde and Samuel (2018) recommended re-adjustment of the curriculum, particularly for both subject building construction and construction measurement courses that contribute the most to the knowledge and skills of the students, and the related issue was also highlighted by Ekundayo (2021), Wang (2020) and Kibwami (2021). This is to develop a matrix in which the students will learn building construction first, and then proceed to measurement courses. Instead, Mahdzir (2021) came up with the issue of determining the assessment methods by taking into account suggestions from the students. This is one initiative that may influence their learning. In contrast, Wao (2018) came up with the issue of improving student learning outcomes.

In summary, the preceding writers identified a variety of curriculum concerns throughout the last decade. The issues of curriculum in QS education are to revisit the learning outcomes approach, investigate the relevance of the course contents, study Bloom's taxonomy applied in the assessments in the QS programme, get the opinion of the students regarding the types of assessments used in the program, and follow the matrix of study for the subject Construction Technology and Measurement Courses. Moreover, there is not much detailed information on any specific aspects of the course contents and curriculum that are claimed to be inappropriate or need to be adjusted, which can be another area of study.

9.0 The Issues of Technology in QS Education

The advent of information technology (IT), the introduction of computer networks and the internet, and the development of interactive tools and software globally have highlighted the issues of technology in QS education (Badarulzaman, 2002). Table 4 depicts two aspects of issues in QS educational technology, respectively the teaching and learning environment and tools.

ASPECTS	TECHNOLOGY	AUTHORS
Teaching and	Learning aid - Virtual learning	Mitchell (2014), Ullah (2020)
learning	environment (VLE), screencast	
environment	tutorial video	
	Massive Open Online Courses	Mohamed (2018)
	(MOOCs)	
Teaching and	Video and interactive	Lee (2013), Wong (2018)
learning tools	PowerPoint	
	Teaching Measurement Courses	Senaratne, and Rodrigo (2019), Ojo
	by new format with the	(2019)
	integration of computer software	
DigiExplanation driven		Kamardeen and Samaratunga
	assessment	(2020)
	Learning management system	Ullah (2020)
	Adoption of e-learning approach	Wong (2018)
to teach Measurement Courses,		
	BIM, VR, 3D computer Modelling	Kim (2012), Ali (2016), Wang,
	(SketchUp, Autodesk Revit, 3ds	(2020), Babatunde and Ekundayo
	Max, VR4Max) and Hologram	(2019), Yap and Aziz (2020),
		Ekundayo (2020), Tayeh and Issa
		(2020), Palis (2022), Dithebe (2022),
		Kibwami (2021)

Table 4 Issues of Technology in Education

The teaching and environment issue was raised by Mitchell (2014), who suggested applying e-tools for QS education, such as the virtual learning environment (VLE) and e-assessment, as more effective than traditional teaching tools. Mitchell's (2014) proposed screencast tutorial videos for VLE will benefit students since students are apparently attached to smartphones, tablets, and laptops in the world of Facebook, Instagram, and Twitter, to name a few.

Mohamed (2018) have introduced another learning environment through Massive Open Online Courses (MOOCs). Students can learn from anywhere and at any time. There are more studies pertaining to the nature of the teaching platform and whether to go face-to-face or online as a teaching platform. Recently, due to the impact of the COVID-19 strike in 2020, there are many more platforms as learning environments that students and educators can choose as hybrid. However, the adaptation and effectiveness of the new platform and environment of learning need more thorough investigation and the constraint to provide such facilities for such environments.

Another technology issue in QS education is teaching and learning tools. Teaching and learning tools also referred as teaching and learning aids comprise of teaching materials, and equipment used by educators for effective teaching, such as computers, mobile devices, and virtual reality (VR) software (Abdullah, 2019; Rasul, 2011). For instance, audio visual aids may increase the sight and sound of individual experiences, which encourages teaching and learning to be more interesting. There are many more alternatives that can be used for interesting teaching and learning tools by integrating modern technology into QS education. For example, Lee (2013) recommended using both videos and interactive PowerPoint in teaching and learning measurement courses to illustrate the construction processes in the drawings and help the students grasp the construction processes in taking-off works. Likewise, the interactive PowerPoint contents consist of screenshots of construction drawings in PDF format with taking-off in Microsoft Excel format; the contents are animated with multicolour lines and arrows and voice recorded to explain on the SMM (Lee, 2013). On the other hand, Ullah (2020) mentioned that learning management systems such as e-learning should be adopted in examining the performance of the students. Others teaching and learning tools such as Hologram, integration of computer software, and mobile networking are also suggested as being used for effective teaching (Wong, 2018; Wang 2018; Senaratne and Rodrigo, 2019; Ojo, 2019; Babatunde and Ekundayo, 2019; Pei Xin and Aziz, 2020; Wang, 2020, Ekundayo, 2020; Kamardeen and Samaratunga, 2020; Mojtahedi, 2020; Tayeh and Raja, 2020; Kibwami, 2021; Palis, 2022; Dithebe, 2022).

Moreover, Kim (2012) and Lee (2013) have suggested integrating technology teaching as a teaching and learning tool. Additionally, Kim (2012) and Ali (2016) suggested approaching building information modelling (BIM) in QS education since BIM started being implemented in the construction industry and it benefits a better understanding of building materials, assemblies, and systems for building systems integration and technical documentation. Further, it is an advantage to integrate BIM as a tool in QS education because it provides 3D simulation of the project, which makes it an effective visualisation teaching approach in

construction education. BIM provides a variety of benefits. However, to implement BIM, a few factors need to be considered, such as the cost of providing the software and facilities and the time to train the educators (Ali, 2016).

With this in mind, education currently faces the new Millennial students, who are different in their attitudes towards learning in institutions (Nimon, 2007). This generation was born in a digitalized world that shaped the way the Millennials' visions and attitudes are completely different from the previous generation, particularly in learning. Gregory (2013) mentioned that millennial students' traits are different from those of the previous generation in that millennials want to be entertained when they are educated, such as by watching, and education has already influenced the design of the curriculum to suit the 21st century skills identified (Larson and Miller, 2011; Ishkov and Leontiev, 2015). However, the characteristics and attitudes of the Millennials create a big challenge for educational institutions to provide the best education for them, and one of the ways is through the integration and innovative use of technology in teaching and learning. According to Nimon (2007) and Szabo (2021), these young generations considered mobile phones and internet tools cannot be separated from their daily lives; they are connected by email, mobile, or the internet, and technologies are simple tools to them. The impact of the mushrooming of technology developed attitudes in these generations, such as having a short attention span, being less punctual, and not being concerned with the authenticity of the information that they get from the internet (Nimon, 2007; Szabo, 2021). Hence, the integration and innovative teaching and learning by using the equipment and tools might attract the students' attention in learning particular courses to overcome the short-span attention, interest to stay learning the programme until graduates, and motivation to be punctual with time.

Succinctly, the issues of technology in education focused on integrating the technologies in teaching QS education, particularly as teaching tools or teaching aids. Modern technology such as BIM, VR, and holograms is used in the industry. Thus, integrating these technologies into QS education will provide an added advantage to the standard and competency level of the students as well as meet the needs of the industry. Furthermore, the learning tool will create interesting presentations of lectures by using videos, photos, interactive PowerPoint, and a learning management system that will provide online storage for students and lecturers to upload and access teaching materials such as lecture notes, videos, and submissions of tasks that can be accessed anytime and from anywhere by the students, categorised as Generations Y and Z, learned more in a haptic environment, where they needed to use their

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ears to listen and their sight to watch and read, but they also needed to do something that they could touch, taste, and smell.

10.0 The issues of Pedagogy in QS Education

Pedagogy is one of the important areas in education to improve the quality of teaching as well as the quality of the products. Based on Table 5, the pedagogy issues in QS education that have received criticism are the pedagogical foundation and pedagogical tactics or pedagogical strategies. The issue of pedagogical foundation in QS education has been raised by Owstrowski (2011) from the perspective of learning by the students, and Kamardeen (2015) has raised a similar issue, but for effective teaching, focusing on the four core pillars of teaching practice: the lecturer's characteristics, module contents, delivery strategies, and assessment methods.

ASPECTS OF	ISSUES OF PEDAGOGY IN	AUTHORS
PEDAGOGY IN	EDUCATION	
EDUCATION		
pedagogical	To develop pedagogical model of	Kamardeen (2015);
foundation	critically reflective practice to	Gurmu (2021); Gurmu and
	becoming effective teachers	Mahmood (2020)
Pedagogical	Comparison of three Instructional	Lee, Lee, and Kovel (2016)
tactics/	model; traditional lecture, problem-	
strategies	based learning, and flipped	
	classroom	
	To identify learning difficulties	Tunji-Olayeni (2016);
	encountered by students in	Yusop (2018);
	Measurement;	
	To adopt Flipped classroom	Mojtahedi (2020)
	To identify suitable teaching	Pei Xin and Aziz (2020);
	strategies	Tunji-Olayeni (2016);
		Senaratne and Rodrigo
		(2019)
	To consider Students' learning style	Kamarazaly (2020)
	and blended learning	
	To enhance/improve teaching and	Zolkafli@Zulkifli (2013);
	learning	Yusop (2018)

Table 5 Issues of Pedagogy in QS Education

Besides, Owstrowski (2011) has developed a pedagogical framework on the seven aspects of difficulties faced by the students into five broad headings: epistemology, cognitive, psychological, environmental, and emotional. Gurmu, Kamardeen, and Mahmood (2021) and Gurmu and Mahmood (2020) again raised a similar issue, but within the experimental theoretical framework that they have developed. All of the studies and recommendations by the previous authors are outside Malaysia, which can further serve as the main reference for further research on the pedagogy used in Malaysian QS education. In truth, there has been relatively little research on the pedagogical foundations of Malaysian QS education.

Another aspect of pedagogy issues in QS education is the pedagogical tactics or strategies, such as the appropriateness of the teaching strategies used to improve teaching and learning, including the teaching methods used. For instance, Kamarazaly (2020) have suggested adopting blended learning in teaching QS education, and the experimental work has been done by Gurmu (2021), which improves the teaching and learning process. Moreover, Mojtahedi (2020) and Lee, Lee, and Kovel (2016) have studied and compared three different instructional models, such as traditional lecture, problem-based learning, and flipped classroom, and proposed the pros and cons of such implementation for students. Furthermore, Szabo (2021) mentioned that millennial students' attention spans are short and active learning with appropriate activities might be helpful to attract the students' attention. Further research on the pedagogical strategies used for the QS programme in Malaysia can be considered as one way for improving current teaching and learning and to suit the attitudes of millennial students.

Based on Laughran (2006) teaching and learning has a relationship in which good teachings reflect the quality learning of the students (Shahida, 2011). Educators or lecturers are the one who contribute a lot to provide high quality of teaching and will embrace effective teaching methods for the students (Kamardeen, 2015). In order to produce highly skilled QS graduates for the construction sector the educators or academicians who are the backbone of the university system need to reconfigure their pedagogy of teaching in order to meet the employers' needs in the country as well as in global context (Safiah, 2017; Azman, 2019).

Meanwhile, students learn in a number of ways, and understanding students' learning styles greatly aids the educator in developing a clear image of the course content and in providing a variety of resources to which students may relate in terms of their own experiences (Kamarazaly, 2020). Findings discovered by Kamarazly (2020) shows that bachelor degree

QS students are kinaesthetic type of learners which are more favourable towards a learning environment where they get to involve in hands-on experience in their learning process.

There are two major kinds of instructional models named as teacher-centered and studentcentered models (Catalano and Catalano, 1999). Lee (2016), compared two student-centered models which are problem based learning and flipped classrooms with a teacher-centered model which is a traditional lecture to improve students' mastery of mathematical knowledge and skills. Their findings showed that there was a significant difference among the three instructional models in which problem based learning approach (student-centered instructional model) was more effective in enhancing students learning compared to flipped classroom and traditional lecture. However, for strong academically students, the traditional lecture ('teacher-centered' instructional model) did better than both student-centered instructional models. Due to the findings, Lee (2016) suggested further study to establish solid theoretical pedagogical strategies.

Wilson (1996) mentioned that pertinent teaching strategies will be very helpful and enable the students to construct their understanding and knowledge of the subject as well as enhance their performance. The teaching strategies are the lecturers' teaching approaches, methods, techniques, and activities (Sulaiman, 2004). According to Awang (2014), the types of teaching approaches are direct approach, experimental approach and inquiry model approach, whereas the elements of teaching techniques are questioning and answering, evaluation technique, delivering technique, presentation technique, communication technique, reading and listening, and assumption busting. In fact, the teaching strategies issues have been brought up related to teaching aid. For instance, Tunji-Olayeni (2016) and Senaratne and Rodrigo (2019) proposed using computer-aided methods for teaching measurement. They claimed that using computer-aided measurement could expose students to QS computer software in the industry and simplify the format and process of the traditional format of teaching measurement and this fall within the technology issues in QS education.

In short, there are several issues that arose on the pedagogy in QS education such as teaching procedures, teaching practice, instruction models, teaching methods, learning difficulties, methods of assessment, effective teaching, and appropriate platform of teaching. The issues should be taken immediately for a betterment of the QS education.

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11.0 Conclusion

As a conclusion, it has been discovered that there are four main issues in QS education in terms of quality of QS education, curriculum of QS education, technology of QS education, and pedagogies of teaching in QS education, which are illustrated in Figure 3.



Figure 3 Framework of main issues in QS education

The first major issue is the quality of QS education, which is concerned with the students' skills and attitudes. The second major concern is the QS education curriculum, which includes improper course topics, the need to enhance learning objectives and results, re-adjust curriculum design, and include students' choices in evaluation techniques into teaching. The third major concern is QS education technology, such as teaching and learning tools and the platform of the teaching and learning environment. The fourth major concern in QS education is pedagogy, which includes the topic of pedagogical foundation as well as pedagogical techniques or methods in teaching and studying the QS core courses.

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Abstract

The majority of Malaysian university students use private motor vehicles to commute within the campus, which contributes to high carbon emissions. To address this, many scholars have suggested the in-campus bike-sharing system as an alternative to reduce carbon emissions and promote a healthy lifestyle. However, it is not known whether students would be interested in participating in such a bike-sharing system if implemented. There are very few students who ride bicycles within the campus, which raises the question of how feasible the bike-sharing system is in practice. This paper aims to investigate students' receptivity towards the bikesharing system in the university campus. The research objectives include; i) to identify the students current travel modes within the university campus, ii) to identify the students' level of interest in using the bike-sharing system and iii. to examine the motivators and barriers of students to participate in the bike sharing system. Data were analyzed from a total of 180 students who responded to a questionnaire survey using Universiti Sains Malaysia (USM) as the case study. The results showed that the percentage of students' in USM using private motor vehicles was less than that of other local universities. The findings revealed that most students were interested in the bike sharing system, motivated by its benefits to health, the environment, and overall traveling convenience. However, the main barriers discouraging their interest were the environmental conditions (e.g. hot weather and hilly terrains) and the lack of infrastructure (e.g. cycling lanes, bike stations and crossing aids for cyclists). The findings are significant for policymakers to introduce changes in university policies and infrastructure when considering the implementation of the bike-sharing system. This is important to ensure the feasibility of the bike-sharing system.

Keywords: Bike-Sharing, University Campus, Students

1.0 Introduction

Transportation is among the primary sources of carbon emission, causing global warming issues (Rodrigue & Notteboom, 2013; Wakeland, Cholette, & Venkat, 2012). Malaysia is ranked as the second-largest emitter of greenhouse gas (GHG) among the other ASEAN countries within the transportation sector (Saxena, 2009). The per capita greenhouse gas (GHG) emission in Malaysia is 5.9 million tons which is three times more than the levels recorded for the whole of Southeast Asia (Salahudin, Abdullah, & Newaz, 2013).

Majority of the university students in Malaysia commute using motorized vehicles resulting in high carbon emission to the atmosphere (Norzalwi & Ismail, 2011; Abdullah & Ismail, 2014). The overflow of motorized vehicles within the campus results in insufficient parking spaces and traffic congestion in the university campus (Lee, Abidin, & Razak, 2007). Subsequently, university students demanded more parking spaces within the campus, and there were many reports on illegal parking, causing further traffic congestion within the campus (Yusof 2013). These local studies indicate that there is a lack of implementation in using other forms of sustainable transport such as cycling within the campus.

Often, universities are committed to becoming a sustainable campus (Norfadillah, Halimaton, Noraziah, & Sarah, 2012; Fonseca, Macdonald, Dandy, & Valenti, 2011; Bilodeau, Podger, & Abd-El-Aziz, 2014). Therefore, a sustainable mode of transportation such as the bike-sharing system is highly encouraged to be adopted in a university campus. The bike-sharing system is a shared facility for users to use bicycles located in different areas (Mateo-Babiano, 2015). Users pay a small amount of fees in order to borrow a bicycle from the stations and to return it to any other stations provided (Mattson & Godavarthy, 2017). The bike-sharing system is very convenient for users as it allows users to lend a bicycle for a short period on a single journey (Shaheen & Zhang, Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future 2010; Fishman, Washington, & Haworth, Bike share: a synthesis of the literature 2013; LDA Consulting, 2013) The most significant number of users in bicycle sharing in the Asia Pacific region are from China, South Korea and Taiwan with over 7500 users to 420,000 users (Cetinkaya, 2017). Unlike other countries, bike-sharing businesses are reported to face many challenges operating in Malaysia.

According to a news article from The Malaysian Reserve, bike-sharing businesses from companies such as Ofo and OBike are forced to stop operating in Malaysia due to lack of infrastructure and regulations, as well as public users' attitude and lack of understanding towards the bike-sharing system (Shah, 2018). However, LinkBike, a bike-sharing system operating in the state of Penang, Malaysia showed good results by achieving 30,197 people

from 61 countries to register as users in the first year of operation (Chiam, 2018). Emissions of greenhouse gas from cycling are ten times lower than from motorized vehicles (Blondel, Mispelon, & Ferguson 2011; Kisner, 2011). The implementation cost of the bike-sharing system is more economical as opposed to the other green transportation such as the eco-van/ bus, and hybrid vehicles (Kisner, 2011) Furthermore, the introduction of bike-sharing system promotes health aside from its positive environmental impact (Gardner & Gaegauf, 2014; Heda, 2012). However, universities in Malaysia lack implementation of sustainable transportation mode within the campus. The ranking of Malaysia in achieving a sustainable university campus is far behind other countries such as Canada, United Kingdom, and America (Suwartha & Sari, 2013). In Malaysia, there are very few students who ride bicycles on campus as a mode of transport, making it uncertain whether the bike-sharing system would be feasible if introduced. While the general interest in cycling has been investigated in Malaysia, the factors affecting the potential feasibility of implementing a bike sharing system at university have not been explored. Thus, this research aims to investigate the students' perception and receptivity to participating in a bike-sharing system on campus. The research objectives are i) to identify the students current travel modes in university campus, ii) to identify the students' level of interest in using the bikesharing system and iii) to examine the motivators and barriers of students to participate in the bike sharing system.

2.0 Literature Review

2.2. Students' Interest in Riding Bicycles

According to a survey done in 2015 by Kluster Penyelidikan Sekretariat Kampus Sejahtera (USM, 2015) among the students of University Sains Malaysia, it showed 79% of respondents (a total of 449 out of 573 respondents) are interested to use bicycle to travel in the campus. However, 55% of them said that they are not willing to buy a bicycle by themselves (USM, 2015). Furthermore, research among students from University Malaya showed that 86.9% of the students are interested in using cycling as their transportation mode, if the university provides bicycle facilities in the campus (Samsuddin Ahmad, & Ahmad, 2016). There are also other constraints that discourage the students from cycling on campus. 30% of students in UiTM think cycling in the campus is hard due to some reasons such as lack of bicycling facilities, weather, and topography, and only 24% of them think cycling in university campus is convenient (Jalalkamali & Niay Ghraei, 2012).

2.3. Motivating Factors for Users to Cycle

2.3.1 Convenience

Convenience is one of the important aspects that are often related to the demand of transportation. According to Fishman, Washington, & Haworth, (Fishman, Washington, Haworth, & Watson, Factors influencing bike share member-ship: An analysis of Melbourne and Brisbane, 2015), bike sharing users have recognized convenience as the main benefits of using a bike sharing system. Users have claimed that they prefer to use bike-sharing systems because it is convenient where time could be saved (Jäppinen, Toivonen, & Salonen 2013; Murphy & Usher 2015; Wang 2018). Using a bike-sharing system helps users to arrive at destinations through robust connectivity with transit hubs (E.Kopca, & Starrett, 2018)). Bikesharing is convenient due to its (1) ability to get around more easily or more quickly (2) ready availability, (3) flexibility in travel, and (4) saves time (National Association of City Transportation Officials, 2015). Willis, Manaugh & El-Geneidy (Willis, Manaugh, & El-Geneidy, 2014) found that convenience, flexibility and the timesaving benefits from avoiding traffic congestion of cycling are important influences on an individual's decision to cycle. In China, the free-floating bike sharing facilities were adopted where the cyclist conveniently uses the facilities (Jing, Yong, Xu, & Yan, 2019). Thus, help to ease traffic congestion, promote low carbon emission and other issues.

According to Lee (2013), convenience could affect the satisfaction levels of users. Shaheen et al. (Shaheen & Zhang, Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future, 2010) noted that convenience is one of the main motivating factors for people to use a bike sharing system. Convenience has been consistently found to be the main facilitator for users to use bike-sharing system around the world, for example in London (Transport for London, 2011), in North America (Shaheen & Zhang, Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future, 2010), in Australia (Fishman, Washington, & Haworth, Bike share: a synthesis of the literature, 2013) and in China (Shaheen, Zhang, Martin, & Guzman, 2011). This also explains convenience in the built environment (Ezgi & Volkan, 2020) of the bicycle networks or path to increase the bicycle usage and promote safety to the cyclist and reduce accident risk. Eren and Emre Uz (2020) added, roads with no bicycle infrastructure and fixed bicycle roads which are interactive with motor-vehicle traffic flows are least preferred routes by bicyclists.

In the perspective of university students, Chai et al. (Chai, Chin, Tan, Woo, & Yong, 2019) found that convenience has a significant relationship with the usage intention of the bike sharing system among the students. Pogačar et al. (Pogačar, Dezan, Lamot, & Rencelj, 2020) also showed (Balkmar, 2020) that convenience is a statistically significant determinant that will affect the cycling rates among students. Based on Teng et al. (Teng, Kutela, Mulokozi, Hu, & Jiao,

2017) study, it was found that convenience is one of the motivating factors encouraging the students to use bike sharing systems.

2.3.2 Health benefits

Useche (Useche, Alonso, Montoro, & Tomas, 2019) proved that people already considered the bicycle a healthy and sustainable means of transportation because it promotes physical activities of people. The benefits of cycling are multi-dimensional as it is considered as an efficient, faster transport mode and reduces time in congested urban areas (Rashid, Hossain, Zarin, & Kumar Sakar, 2020). Cycling is good for our physical health in terms of making improvements in cardiorespiratory fitness, which is the disease risk factor. Besides that, cycling can also help in risk reduction for all-cause and cancer mortality and for cardiovascular, cancer, and obesity morbidity (Fuller, Gauvin, Kestens, Morency, & Drouin, the potential modal shift and health benefits of implementing a public bicycle share program in Montreal, Canada, 2013). In Sweden, an initiative called 'the Moved beyond Zero' campaign held to change the perspective by making cycling more attractive to potential riders and through increased public health benefits (Balkmar, 2020). Physical activities not only improve physical health, but it is also connected with mental health conditions (Penedo & Dahn, 2005). Mead et al. (Mead, 2009) showed that exercise can improve depressive symptoms and be an alternative method to treat depression. Physical activities can also improve cognitive function in different age groups (Pedersen, 2009).

The results that cycling can improve people's health might motivate them to travel using bicycles. Health benefits are found to be one of the main motivators for cycling which makes the experts think that users are concerned about their health in choosing travel modes (Jahanshahi, Kharazmi, & Ajza Shokouhi, 2018). Shokoohi & Nikitas (Shokoohi & Nikitas, 2017) found health benefits is one of the greatest motivations to cycle in Kuala Lumpur, Malaysia. In the context of university students, there are many studies showed that health benefits are the main motivation for the students to cycle in Australia (Whannel, Whannel, & White, 2011), in UK (Swiers, Pritchard, & Gee, 2017) and in US (Teng, Kutela, Mulokozi, Hu, & Jiao, 2017) and Sweden (Balkmar, 2020). Another study carried out by Hosford et al. (Hosford, 2018) found that people that are younger or with lower income tend to be the potential users of bike-sharing systems, and one of the top motivators found was related to health benefits.

2.3.3 Environmental Awareness

Bike-sharing system is known to be able to bring positive impacts to the environment. The environmental impacts of the bike-sharing system include reducing carbon emissions, reducing air and noise pollution, as well as reducing traffic congestion and fuel use (Sobolevsky, Levitskaya, Chan, Postle, & Kontokosta, 2018).

Environmental awareness was defined as the level of environmental problems awareness and giving effort in solving the problems or showing willingness to contribute something individually regarding the problems (Sang & Bekhet, 2015). There are studies showing that environmental awareness (environmental attitudes, knowledge, and problem awareness) would affect the choice of transportation modes. According to Johansson et al. (Johansson, Heldt, & Johansson 2006), people with good environmental attitudes, such as having recycling habit, is found to prefer using environmentally friendly travel methods. Shena et al. (Shena, Sakatab, & Hashimotoc, 2008) also showed that people with high environmental consciousness prefer transportation modes that are more sustainable.

According to Maffia, Silva and Gonçalves (Maffia, Silva, & Jocovine, 2011), most university students are aware of responsibility in decreasing issues regarding the environment. Ahmad, Noor and Ismail (Ahmad, Noor, & Ismail, 2015) and Jalalkamali & Niay Ghraei (Jalalkamali & Niay Ghraei, 2012) figured out Malaysian university students had high level of environmental awareness and environmental knowledge, had a good attitude towards environment, as well as had the interest to learn and adopt the sustainable practices. Nevertheless, Pogačar et al. (Pogačar, Dezan, Lamot, & Rencelj, 2020) found different results that ecological orientation is statistically insignificant among the students in the university city of Maribor, Slovenia. Chai et al. (Chai, Chin, Tan, Woo, & Yong, 2019) also found environmental awareness does not have an obvious impact on the usage intention among university students. These studies showed that there are uncertainties on whether environmental awareness motivates university students to use bike sharing systems due to the potential that students have increased concern on the environmental issue.

2.3.4 Personal Factors

Usage of bike sharing systems will also be affected by personal factors. In this study, personal factors that can affect bike sharing system usage are categorized in to 3 aspects, which are financial, relaxation, and social.

The affordability of the bike sharing system has become one of the motivating factors to encourage people to cycle. People would prefer to cycle which is low in cost, due to financial issues or wish to save money (Chunha & Silva, 2018). Financial savings has been found to be the main facilitator for people with low income to cycle through previous studies (Fishman, Washington, Haworth, & Watson, Factors influencing bike share member-ship: An analysis of Melbourne and Brisbane, 2015). LDA Consulting (LDA Consulting, 2013) has done research on members of Capital Bikeshare and noted that young members and low income members prefer to use bike-sharing system due to the cost advantages. Shannon et al. (Shannon, 2006) showed saving money is the most motivating factor for students to cycle in the university campus.

There are people that are motivated to cycle for relaxation and fun as motivating factors of users will change depending on the purpose of trips. Most people choose convenience as their main consideration when going for a work trips, but prefer relaxation and fun when travel for leisure. Transport for London (Transport for London, 2011) has done research which proved that 'having fun' is the key facilitator for casual users to use a bike-sharing system. 76% of members of Washington, D.C.'s Capital Bikeshare program agreed that fun is an importantfactors to motivate them in travel using bike-sharing system (LDA Consulting, 2013). Moreover, a study done by Swiers, Pritchard & Gee (Swiers, Pritchard, & Gee, 2017) found that university students' cycling motivators were enjoyment and improving fitness. Aldred (Aldred, Woodcock, & Goodman, 2016) and Heesch et al. (Heesch, Giles-Corti, & Turrell, Cycling for transport and recreation: associations with socioeconomic position, environmental perceptions, and psychological disposition 2014) highlighted that young adults who aged between twenties to early thirties are most likely to cycle for leisure. Nevertheless, there are also research showed that fun is not as important as other motivators such as convenience, docking station proximity, and health benefits, because it ranked after the other motivators in the study (Fishman, Washington, & Haworth, Bike share: a synthesis of the literature, 2013). According to Chang & Chang (Chang & Chang, 2009), besides fun recreation and stress relief, people also noted that having a chance to make friends and broaden social networks are motivating factors for them to cycle. By cycling with others, there are opportunities to create new social relationships and strengthen previous social bonds with friends and families (Gatrell, 2013). In this study, we will further investigate the three aspects (financial, relaxation, social) and figure out the main variables that would encourage the students to use the bike sharing system.

2.4. Barriers to Taking up Cycling

Many barriers deter cycling as a regular means of transportation. Previous surveys have identified barriers such as environmental factors, safety concerns, lack of infrastructure, and individual factors (National Institute for Health and Care Excellence, 2012). One of the main deterrents for cycling is environmental factors. The temperature, precipitation, humidity,

seasonal climate and topography play an essential role in influencing the rate of cycling activity. Studies conducted in the four-seasons countries found that cycling activities are significantly affected during cold days or snowing (Nankervis 1999; Bergström & Magnusson 2003; Brandenburg, Matzarakis, & Arnberger, 2007). On the other end, high temperatures and high humidity also have a negative effect on cycling (Miranda-Moreno & Nosal, 2011). A study by (Gebhart & Noland, 2014) indicated the moderate range of temperature, between 15 to 32°C is the best range for cycling activity.

On top of that, precipitation also affects the cycling and bike-sharing system; the usage is not only low during raining but also three hours before the rain (Nosal & Miranda-Moreno, 2014). The topography is also another environmental factor that discourages cycling. If the slopes of the hill exceed 4%, commuters consider this as a constraint to cycle around the city (Chunha & Silva, 2018).

In the case of Malaysia, situated just north of the equator, the country experiences an equatorial climate (McGinley, 2011). Previous studies showed that being prone to high temperature, high humidity, frequent rains, and hilly land surface, profoundly affects the cycling activity in Malaysia (Jalalkamali & Niay Ghraei, 2012; Faghih-Imani, Eluru, El-Geneidy, Rabbat, & Haq, 2014). A study on bike-sharing system usage showed that Malaysians preferred to use this service only during good weather conditions (Faghih-Imani, Eluru, El-Geneidy, Rabbat, & Haq, 2014). Previous studies conducted in Malaysia have shown how the weather is the main barrier for the users to use a bike-sharing system (Jalalkamali & Niay Ghraei, 2012; Faghih-Imani, Eluru, El-Geneidy, Rabbat, & Haq, 2014).

In a wide range of literature, safety has been continuously identified as the most crucial factors for users in making the decision to cycle (Dill & Carr, Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them, 2003; Dill & Voros, Factors affecting bicycling demand: Initial survey findings from the Portland, Oregon, region, 2007; Gatersleben & Appleton, 2007; Koorey, Kingham, & Taylor 2009; Winters, Davidson, Kao, & Teschke, 2011). These safety concerns that stop the public from cycling are not only limited in developing countries like Malaysia but also other developed countries such as Australia, the United Kingdom, and North America (Fishman, Washington, & Haworth, Bike share: a synthesis of the literature, 2013; Kadir, Lim, & Law, 2019). Safety concerns refer to physical factors such as unsafe road condition, inadequate road and bicycle infrastructure (Antonakos 1994; Dill & Voros, Factors affecting bicycling demand: Initial survey findings from the Portland, Oregon, region, 2007; Winters, Davidson, Kao, & Teschke, 2011). Besides that, safety concerns also non-physical factors such as fear of collision with motor vehicles, motorists' behavior (Bauman & Rissel, Cycling and health: an opportunity for positive change, 2009; City of Sydney, 2007; Garrard, Crawford, & Hakman, 2006; Fishman, Washington, & Haworth, Bike share: a synthesis

of the literature, 2013). In details, it can be concluded that the safety concerns of cyclists that have been identified from previous studies are: (1) dangerous traffic condition, (2) lack of bicycle infrastructures, (3) fear of sharing the road with motor vehicles, and (4) other drivers' attitude and behaviour. Previous studies found that the presence and quality of bicycle infrastructure can profoundly affect the rates of cycling as it is strongly related to the traffic safety of cyclists (Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003; Korse, 2016). Many factors contribute to infrastructure issues such as lack of routes, inadequate lighting on cycle paths, unattractive and low-quality bikes, insufficient stations and poor spatial distribution, absence of crossing aids for cyclists and cycle lanes markings, and poor traffic signs (Jahanshahi, Kharazmi, & Ajza Shokouhi, 2018; Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003). Especially for the bikesharing system, the presence of special lanes for cyclists positively increased the rates of cycling. Nonetheless, due to the original design of the transportation network, it is challenging to implement this infrastructure (Buehler & Pucher, 2017; Winters, Davidson, Kao, & Teschke, 2011; Faghih-Imani, Eluru, El-Geneidy, Rabbat, & Haq, 2014; Buck & Buehler, 2012; Parkin, Wardman, & Page, 2007). This problem is also reported in the Malaysian context, where the lack of bicycle infrastructure is the main factor of non-successful bike-sharing operations in Malaysia (Shah, 2018). Physical activities like cycling, indeed require motivation, time, and energy. These requirements are often related to personal factors that caused people to avoid cycling (Hudoh, 2016; Manaf 2013; National Institute for Health and Care Excellence, 2012). For example, a study conducted on the students of Universiti Malaysia Pahang (UMP) showed that motivation played an essential role in cycling activity. This study identified that laziness, tiredness, and lack of motivation deterred them from cycling (Hudoh, 2016). Apart from motivation, previous studies also showed that reluctance in involving physical activities also deter individuals from taking up cycling (Sallis, Hovell, & Hofstetter, Predictors of adoption and maintenance of vigorous physical activity in men and women, 1992; Manaf, 2013).

3.0 Research Methodology

The research methodology for this research adopts a case study of Universiti Sains Malaysia, Penang. The university was established in 1969 as the second oldest university in Malaysia. USM had advocated the Education for Sustainable Development (ESD) since the year 2000 through the concept of a university in a garden and a healthy campus. The university strongly encourages the promotion of sustainability among the staff and students on campus. The promotion of riding bicycles has been advocated by the university through several campaigns such as the charity campaign in 2015 (USM, 2015). The population size of the students in USM are approximately 20,000 giving a sample size of 377 according to Krejcie and Morgan (Determining Sample Size for Research Activities. Educational and Psychological

Measurement, 1970). A total of 180 respondents were obtained giving a response rate of 48%. The survey was sent out using an online survey (Google Form) through social media platfom (i.e Facebook). Among the Facebook pages are 'USM Info sharing corner' and 'USM Confession". Both Facebook pages are actively used by the students. The online questionnaire was opened from 21 March 2020 to 19 May 2020. The questionnaire was developed based on an extensive review of the literature. The questionnaire contained four (4) sections. Section A is on the socio-demographic questions that are related to respondents which are about their gender, year of study, and faculty/ school of study. The section also contained questions on the students' frequent choice of travelling mode. Section B pertained guestions on the interest level of the students to use bike-sharing system in the university campus. Section B are based on five-point Likert scale. The scale ranges from (1) to (5) according to the level of interest. Each scale represents the subsequent rating of: (1) Not at All Interested, (2) Not Very Interested, (3) Neutral, (4) Interested, and (5) Very Interested. Section C focuses on the variables that motivate the students to use bike-sharing system in university campus which are Convenience, Health Benefits, Environmental Concern, Individual financial savings, and Fun/ Recreation. Meanwhile, Section D focuses on the variables that constraint the students to use bike-sharing system in university campus which are Natural Environment Factors, Safety concern, Lack or Poor Infrastructure, and Personal Barriers. Section C and D are both adopts a five-point Likert scale. Each scale represents the subsequent rating of: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree.

4.0 Results and Discussion

4.1. Research Objective 1: To identify the students current travel modes in university campus



Figure 1: Students' Travel Mode in University Campus

Results in figure 1 indicate that the proportion of students commuting using private motor vehicles were not much different with those who commute using buses and walking with each at approximately 30%. The results on the percentage of students commuting via private vehicles in USM is less by approximately 10% to 20% than the previous studies in other local institutions. Hashim (Hashim, Haron, & Hassan, 2013) found that 42% students travel using private vehicles across 10 local public and private universities. Other studies showed about 40% of Universiti Kebangsaan Malaysia (UKM) students preferred using private vehicles (Norzalwi & Ismail, 2011) and 50% of Universiti institut Teknologi MARA (UiTM) students chose motorcycles to travel in the campus (Jalalkamali & Niay Ghraei, 2012).

Interestingly, there were more students in USM at 32% who chose to walk as their main transportation than students from Universiti Teknologi Malaysia (UTM) with only 9% (Abdullah & Ismail, 2014), and 24% students from UKM (Norzalwi & Ismail, 2011). The results also contrast with study done by (Wardman, Tight, & Page, 2007) which highlighted students are more interested in traveling with motorized vehicles compared to active transportation such as walking for the purpose of attending lectures or performing daily routines. Perhaps there are fewer students in USM commuting via private vehicles and more students walking since the layout of the campus is smaller and compact compared to other institutions in Malaysia. The limited land size of the area in USM causes buildings and facilities to be close by within a walking distance (Razak, Abdullah, Nor, Usman, & Cheh-Ani, 2011). Furthermore, the concept of the university of a garden provides many walking pathways with sufficient natural shadings from the trees planted which creates a pleasing environment.

As for traveling via internal buses provided by the university, most students at 38% use buses to commute. The results are similar to other local studies where 36% of students from UKM (Norzalwi & Ismail, 2011) and 31% students from UTM (Abdullah & Ismail, 2014) commute via buses. These results indicate that internal sources are used optimally and can potentially promote a lesser percentage of students using private motor vehicles if more buses are provided and efficiency of the time management of buses is improved.

Cycling is the least chosen transportation to travel in the campus among USM students. From the results in figure 1, only 1% of the respondents chose bicycles as the main travel mode in the campus. It showed similar results as previous study in other Malaysian universities such as UiTM Alor Gajah, Perak Campus and UKM, also showed 1% of the students use bicycles as a mode of transport (Samsuddin, Ahmad & Ahmad, 2016; Norzalwi & Ismail, 2011). The results are also not much different from Asian countries such as Chulalongkorn University in Thailand where only 2% of students cycle (Yan, 2020). These results indicate that there is significantly
less number of students cycling compared to other western countries such as in University of California, Berkerly United States, where half of the campus community cycles (Zainal, Borhan, M. N., Ibrahim, Yaakub, & Yazid, 2019), and in University of Western Australia 47% students either walk or cycle (Shannon, 2006).

4.2. Research Objective 2: To identify the students' level of interest in using the bikesharing system

The results (Figure 2) show that while only a small portion of USM students currently cycle on campus, most students (78%) were interested in the bike sharing system. This indicates that students were more likely to cycle if bicycles were provided to them by the university (Jalalkamali & Niay Ghraei, 2012). Yang and Long (Yang & Long, 2016) explains that people preferred using public bicycles than privately-owned bicycles as it prevents the risk of their own bicycles being damaged or stolen (Yang & Long, 2016). A survey done by Kluster Penyelidikan Sekretariat Kampus Sejahtera in 2015 showed that 55% of students were not keen on using their personal bicycles or not willing to buy a bicycle themselves (USM, 2015). The findings corroborate with University of Malaya which found 86.9% of its students inclined to cycle if bicycle facilities were available on campus (Samsuddin, Ahmad & Ahmad, 2016). The university plays a key role in encouraging cycling among students by improving the university infrastructure for cycling conditions and introducing bicycle schemes (Shannon 2006; Molina-García, Castillo, & Sallis, 2010). Past studies have shown that the availability of good infrastructure and schemes such as bike-sharing programs and bicycle rentals effectively increased the use of bicycles on campus (Kersey & Neighbor, 2011; Ashley, 2012; Tang, 2011). Theoretically, the bike sharing system suggests a promising outlook.



Figure 2: Students' Interest Level in the Bike Sharing System

However, the bike sharing system has not been widely implemented in universities in Malaysia. Anecdotal evidence suggests that this is prevented by issues stemming from strategic and operational processes with regards to how it is implemented in practice. To ensure its success, universities need to consider various factors before deciding to implement the bike sharing system including establishing that the program is sufficiently planned, funded, applied, and aligned with measurable goals (Raja Abdul Aziz, Roza, Adji & Karim, 2011; On Bike Share Inc ,2012). It is also crucial to investigate the needs and perspectives of the campus community affecting the prospect of bicycle use on campus (Kumar, 2013). Thus, while there is high interest in the idea of the bike sharing system, this alone is insufficient to ensure its feasibility in practice. It is important to understand the motivations and barriers affecting the practical circumstances of cycling so that changes can be made to create a cycling-friendly environment.

4.3. Research Objective 3: To examine the motivators and barriers of the students in using bike sharing system in a university campus

Health benefits (M=4.33) were found to be the main motivation for USM students to use the bike sharing system in the university campus. Students who have a positive attitude towards physical activity would engage in more frequent and intense exercise (Mowatt, Depauw, & Hulac 1988). McKenzie (McKenzie, 2014) said that the younger generation aged 16 to 24 has a higher probability to use bicycles as transportation, and the probability decreases quickly as the age groups increases. According to Hosford et al. (Hosford, 2018), younger people like students tend to be the potential users of bike-sharing systems as health benefits would be their top motivator to cycle. Previous study done by Swiers et al. (Swiers, Pritchard, & Gee, 2017) also showed that the top motivator of cycling among university students is to improve fitness. Recent study by (Peruzzi, 2020) identifies the health benefits of physical activities including cycling activities regularly can improve cardiorespiratory fitness, hence, reducing mortality and morbidity.





Environmental concern (M=3.99) is the second key motivation for USM students to use a bike sharing system. Students are willing to cycle in the university campus due to concern on the environment conditions, and wished to make some contribution to the environment. It is different from the previous study that showed university students lack awareness of the environmental benefits of cycling, and environmental factors are not their top motivation factors (Swiers, Pritchard & Gee, 2017). The results showed that USM students have generally high awareness of sustainability. Higher education community plays an important role in environmental education and sustainable development. According to Stough (Stough, Ceulemans, Lambrechts & Cappuyns, 2018), educational institutes adapting sustainability in their vision, policy, teaching, and in particular their curriculum can increase sustainability awareness of students. Through education, the sustainable mindset of students can be nurtured. Corcoran and Wals (Corcoran & Wals, 2004) said that higher education is crucial in leading society towards sustainability. Moreover, studies by Mateo-Babiano et al. (Mateo-Babiano, 2015), emphasizes that universities nowadays are implementing a public bike sharing program as one of the strategies in achieving a sustainable and greener campus. This has proved that USM has done a good job in diffusing sustainability in higher education (HE), which is in line with its APEX agenda of 'Transforming Higher Education for a Sustainable Tomorrow'. Furthermore, Higher education (HE) institutions should support a more thriving sustainable behavior on a greener campus by promoting active transport activities such as walking and cycling (Molina-García, Castillo, & Sallis, 2010).

Convenience (M=3.98) also obtained a high mean score as students' motivation to use the bike sharing system, which is the same as previous studies' results. In previous studies, convenience often represents the strongest motivation to use a bike sharing system. One of the studies proved convenience is the main motivator to use bike-sharing was done by Fuller (Fuller, Use of a new public bicycle share program in Montreal, Canada, 2011). Study done by Bachand-Marleau (Bachand-Marleau, Lee, & El-Geneidy, 2012) further proved that convenience is one of the key factors that motivate the public to use bike-sharing. Shaheen (Shaheen, Martin, Cohen, & Finson, 2012) has done an online survey in North America and found out convenience is the main facilitator for bike-share members and the operators. Not only in North America (LDA Consulting, 2013; Minnesota, 2010), convenience has been consistently found to be the main facilitator for users to use bike-sharing system around the world in many other countries, like China (Shaheen, Zhang, Martin, & Guzman, 2011), London (Transport for London, 2011) and Australia (Fishman, Washington, & Haworth, Bike share: a synthesis of the literature, 2013). The resulting bond with the (National Association of City Transportation Officials, 2015) stated

the convenience factors rely on the ability to get around easy and quicker, readily availability, flexible travel time and save times.

Financial savings (M=2.77) and fun recreation (M=2.75) are the least agreed motivators for USM students to use the bike sharing system. This result is different from the previous study by Shannon et al. (Shannon, 2006) that showed saving money is the most motivating factor for students to cycle in the university campus. Kellstedt et al. (Kellstedt, Spengler, Bradley, & Maddock, 2019) said that the students will only go for a bike sharing system when it is free to use. If using a bike sharing system in the campus requires money, they would prefer to use shuttle buses on the university campus.

Thus, it is found that the students do not prioritize their personal factors such as financial savings or having fun as their main motivator to use a bike sharing system. The students cared more about health and environment factors more than personal factors.



Figure 4: Students' Barriers to Use Bike Sharing System in University Campus

Based on Figure 4, environmental conditions scored as the main barrier for students to use the bike-sharing system (M=4.17). This result is consistent with many studies that identified environmental factors as the main deterrent for cycling activity (Nankervis, 1999; Bergström & Magnusson 2003; Brandenburg, Matzarakis, & Arnberger, 2007). A study by Jalalkamali & Niay

Ghraei (Jalalkamali & Niay Ghraei, 2012) highlighted that the most challenging factors for students to cycle in the Malaysian university campus are the land surface and hot, humid weather of Malaysia. As the USM campus landscape has many hills, the hilly and bumpy topography in USM increases the difficulty of cycling for the students. Thus, the result of this study further supports the findings by (Jalalkamali & Niay Ghraei, 2012). On another note, the high humidity, temperature, and rainfall also affect the convenience of cycling on the campus. These environmental factors as deterrents for cycling activities were also evident in previous studies in countries such as India (Verma, Khuperkar, Fishman, & Eggers, 2016) and Singapore (Meng, Zhang, Wong, & Au, 2016), which share similar weather.

Lack of or poor infrastructure ranked as the second barrier (M=3.99). Previous studies highlighted the importance of the infrastructure to encourage cycling activities (Jahanshahi, Kharazmi & Ajza Shokouhi, 2018; Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003; Buehler & Pucher, 2017). Bicycle infrastructure plays a vital role in affecting the usage of the bike-sharing system because it is strongly related to the traffic safety of cyclists (Korse, 2016). Being ranked as the second barrier may indicate that the current facilities provided around the USM campus are still lacking, thus discouraging students from opting for the bike-sharing system in some parts of Malaysia (Shah, 2018). Therefore, it is vital to consider by the campus management to improve the infrastructure needed for cycling before providing a bike-sharing system within the campus.

Students ranked safety concerns as the third deterrent for using the bike-sharing system in university campuses (M=3.75). This finding is contrary to other studies that ranked safety concerns as the significant barrier to cycle (Dill & Carr, Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them, 2003; Dill & Voros, Factors affecting bicycling demand: Initial survey findings from the Portland, Oregon, region 2007; Gatersleben & Appleton, 2007; Koorey, Kingham, & Taylor 2009; Stinson & Bhat, 2004; Winters, Davidson, Kao, & Teschke, 2011; Akar & Clifton, 2009). One of the possible explanations for this contrast is that the respondents for this study are young people who might perceive cycling as a safe mode of traveling (Wegman & Dijkstra, 2012; Feleke, Scholes, Wardlaw, & Mindell 2017). Further, there is also evidence that showed cycling is less likely to result in a fatality compared to riding a motorcycle or walking (ITF, 2018).

The results of the survey found that personal factors, such as laziness, no confidence, or no motivation, were the least agreed factors for students to use the bike-sharing system in the campus (M=2.81). It is different from previous studies that showed personal factors were the critical barriers for students to cycle (National Institute for Health and Care Excellence, 2012; Hudoh, 2016; Ebben & Brudzynski, 2008). Based on the present study, it shows that the students do not perceive that laziness and disinterestedness in doing physical activity as the main deterrent for them to take up cycling, as shown in other studies (Sallis & Hovell, Determinants of exercise behavior, 1990; Sallis, Hovell, & Hofstetter, Predictors of adoption and maintenance of vigorous physical activity in men and women, 1992; Manaf, 2013). Instead, other external factors were considered as the main barriers to internal individual factors. It is important to note that many factors determine the choice of doing physical activities such as social, community, and environmental factors (Pender, Murdaugh, & Parsons, 2006; Fitzgerald & Spaccarotella, 2009). Therefore, to encourage cycling activities, all these external barriers should be addressed.

5.0 Conclusion

The study concludes that students used a range of transportation mediums on campus such as internal buses, private motor vehicles and walking. Cycling is currently an unpopular choice for students in Malaysia due to barriers such as climate and ground conditions, lack of facilities, concerns with safety, and personal preferences. Despite this, the study finds that there is high interest in the idea of cycling where bicycles are provided for student use on campus. It appears that cycling is only appealing to students if public bicycles are available as it avoids the risk of personal loss from bicycle theft as well as damages. This points towards a promising prospect for the introduction of a bike sharing system. However, interest alone is insufficient to ensure its feasibility. The university needs to consider issues related to the practical implementation of the bike sharing system. While students were motivated by the potential benefits of cycling to health, the environment, and travel convenience, they were greatly discouraged by barriers such as adverse environmental conditions (e.g. hilly grounds and hot weather) and the lack of infrastructure available (e.g. cycling lanes, bike stations and crossing aids for cyclists). Thus, in order to ensure the feasibility of a bike sharing system, it is crucial that the university improves its infrastructure to address these barriers and support a bike-friendly environment. The findings contribute important knowledge of the factors affecting cycling as a potential means of transportation on campus. From a university management perspective, this is significant as a basis for deciding changes to university policies and introducing new programs such as the bike sharing system. The establishment of these policies and programs will have significant influence on students' engagement with cycling as a healthy and practical mode of transport at university. The study provides valuable insight to the idea of a bike sharing system from the perspective of students. Future studies are encouraged to explore the perspective of the university management team to understand the key issues and considerations of implementing the bike sharing system from a bureaucratic order.

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THE IMPORTANCE OF THE LEASE EXTENSION PREMIUM CALCULATION FORMULAE FOR A LANDED RESIDENTIAL PROPERTY

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Abstract

Malaysia is having a development growth in the built environment after the Covid-19 pandemic, the post-pandemic has impacted the ecosystem of the real estate industry. Generally, the progressing development in the current housing trends has impacted the property market. The current Malaysia Market Value of the houses are affected by location factor, property tenure namely freehold and leasehold and building age factor. The aim of this paper is to determine the latest leasehold extension procedures technically in Malaysia from the initial stage of application to the final stage of getting the leasehold extension approval. Hence, the above findings of the leasehold extension are obtained from the practices of valuer and estate agency from the secondary data in a sale property transaction by reviewing in an agreement or documents between a landlord and a Joint Agent in a case study. The evidence recorded in one working file will be used as a case study to implement the calculation of the lease extension. A case study of a single-storey detached house at Petaling Jaya, Selangor, Malaysia with an unexpired leasehold term of estimated 42 years was duly executed for this paper presentation. The property leasehold interest is subjected to the tighter measurement for housing loan approval set by the bank as compared to the sale and purchase of a freehold property. According to the law the State Government will acquire the property after the leasehold expires. The leasehold extension to another sixty (60) years of the property will increase the chances of the property becoming marketability successful marketable in the real estate market. The literature review will discuss the various information in the lease extension using three (3) formulae for the leasehold premium calculation. This paper will benefit the residents who lived in the properties under leasehold ownership, the sellers and potential buyer and the licensed valuers, estate agents and property managers in Malaysia.

Keywords: Market value, sale and purchase, joint agency, leasehold ownership, and lease premium calculation.



1.0 Introduction to Land Alienation

The Malaysian land law and procedures stated that the State Authority has the highest right to grant to a person and body the land by disposing of the property through a grant of title in the alienation process (Ainul & Sharifah, 2022). The State Authority has the right to dispose of the State land in perpetuity or for a term of years subject to an amount of annual rent payment or premium (if any), the land title will be imposed with a certain category of land use, conditions and restrictions in interest to the land which is alienated to the landlord to the right of the land attached herein (Ainul & Sharifah, 2022).

The alienation of land is subject to a certain number of years but not exceeding 99 years under section 76(a) of the National Land Code. The land can also be alienated in perpetuity with three circumstances (Ainul & Sharifah, 2022; ILBS, 2020a). The first circumstance is when the Federal government gave orders to the State Authority to cause the alienation of the land granted to the Federal government. Secondly, the State Authority may grant the land for public purposes when he is satisfied with the disposal purposes. Thirdly, the State Authority may grant the land for a special circumstance that the State Authority may think alienation is appropriate to do so for the special reason. Otherwise, the State Authority may not grant the land in perpetuity, and alienate the land or any part forming the surface of the foreshore or seabed for more than 99 years (Ainul & Sharifah, 2022; ILBS, 2020a).

The State land rules will prescribe the form in application of land alienation. Most of the time when the alienation is granted approval, several matters will be highlighted in the approval; which is the area approved for alienation, the number of years for the land alienated, the form of the title held under for final title or qualified title, the imposition of the annual rate and premium, the express conditions and the restriction of interest to be imposed (Ainul & Sharifah, 2022; ILBS, 2020a). A formal letter to inform of the land alienation will be delivered to the applicant and the land will still be registered under the State land until the land title were registered and transferred to the applicant's name at the land office (Ainul & Sharifah, 2022; ILBS, 2020a).

The types of title issued under the National Land Code to the proprietor are either held under the final title or qualified title. The qualified title is the land title where the land area is not surveyed, meanwhile the land held under freehold title is surveyed in the land area by licensed land surveyors. The qualified title may not perform the sub-division, amalgamation and partition because the land is not surveyed formally and the title is not issued with a final title. There are two types of final title identified as registry title and land office title. The registry title is administered by the Registrar of Titles at the State Land Registry while the land office title is administered by the Land Administrator at the District Land Office (Ainul & Sharifah, 2022; ILBS, 2020a). The classification of the land title is based on the land area and categories, the Registry title is for the land known as a town and village land as well as the country land not exceeding four hectares in area (Ainul & Sharifah, 2022). The land alienated by the State Authority as a foreshore or seabed is also held under registry title. Meanwhile, the land office title is for land known as country land with the land area not exceeding four hectares (Ainul & Sharifah, 2022; ILBS, 2020a).

In the matters of land alienation application, a notice of Form 5A will be issued to the new proprietor informing of the types of charges and payment for receiving the alienation approval subsequently (Ainul & Sharifah, 2022; ILBS, 2020a). There are several land revenue dues to be paid by the applicant to obtain the land ownership and lengthen the lease application periods. These include the first year's rent, premium, survey fee and fee for the registration of title. All payments must be made within the stipulated time frame or else the application will lapse and another fresh application for alienation will be required by the applicants (Ainul & Sharifah, 2022; ILBS, 2020a).

2.0 Background of the Sales and Purchase of Property

A house buyer can purchase a property from the developer or the sub-sale market because of choices to select in the decision-making. The sale and purchase of the property from the developer is bound by a standard sale and purchase agreement, whereas the sub- sale market does not have a standard format of sales and purchase agreement due to the terms and conditions being freely incorporated by the normal legal practices (Tan, 2014). The houses purchased under the normal circumstances with the developers is subject to the requirement for housing construction period of completion within 2 to 3 years and the money that is paid for the houses are usually at the prevailing price because of the appreciation of property prices after its completion (Tan, 2014).

Meanwhile, the sale and purchase agreements are regulated under the law by the Housing Development (Control & Licensing) Act 1966. The act gives a standard guideline and format for the developers to draft the sale and purchase agreements for the purchasers (Tan, 2014). Likewise, the property sold under the secondary market will be finalized by willing sellers and willing buyers through an agreement agreed between both parties drafted by the seller and buyer's lawyer (Tan, 2014). The agreement will include the terms of conditions for vacant possession duration, times of essence to draw down the full amount of housing loans and subsequent full settlement of the quit rent, fire insurance and assessment for the particular property.

The transaction can be done through a formal process in the sale and purchase procedure including the procedures to appoint the estate agent to sell the property, signing the appointment form as a joint agent, measuring the property, capturing the subject property photos and advertising the property in the website as a support for the description of the property. Besides, the landlord is allowed to appoint other estate agents to arrange the potential clients to make the appointment for site viewing, carry out the process of dealing and negotiation for the selling price with the landlord, getting the consent to sell the property after having agreement between the willing seller and willing buyers to do a transaction of property in the property market.

3.0 Challenges in the Property Transaction in the Valuation Department and Estate Agencies Departments

Ownership or possession of a landed residential property is significant to the homebuyer because this is a security in the property as a sign of quality living standards, home affordability level and the chances to get to live in a comfortable environment (Gan, Azizah, 2021; Ainul & Sharifah 2022). There are many ways to dispose of the landed residential property either selling by a private treaty or appointing an estate agent to sell the asset in the real estate market (BOVAEAPM, 2020; ILBS 2013; ILBS, 2020b). The appointment of an estate agent to sell the property was categorized in five types prior to the amendments of the Estate Agency Standard in 2014, known as the exclusive agency, sole agency, sole joint agency, joint agency, and ad-hoc Basis or commonly referred to as "Open Listing" (BOVAEAPM 2020; BOVAEAPM, 2014; BOVAEA, 1999).

Thereafter, in the year 2014, the Estate Agency Standard removed the sole joint agency because there are already existing sole agency and joint agency in the act which should not be separated from the sole joint agency (BOVAEAPM, 2014; BOVAEAPM, 2020). The sole joint agency was formerly defined as the agency that will provide the fee in a pre-agreed formula from the principal and have the advantage for the estate agents in control to compensate other estate agents flexibility at the same time. The weaknesses are due to the sole joint agency and joint agency being incompetent in the definition, especially in terms of fees.

In this paper, it will focus on the joint agency. There are four types of estate agencies in Malaysia which will be discussed in this paper because each type of the estate agency is represented by different numbers of estate agencies, negotiators and the commission was collected according to the types of appointment of estate agencies. The definition of the joint agency according to the Estate Agency Standard, third edition is one or more estate agents are appointed and only the estate agent who closes the deal gets paid. The number of agents appointed are limited and each is aware of the appointment of the others (BOVAEAPM, 2014).

The Covid-19 pandemic in Malaysia caused many houses not able to be sold out because of the challenging economic condition and the steep competition in the secondary property market because properties are illiquid in nature. There were several ways that have been identified by sales estate agents to sell the properties in the secondary market (sub-sales) such as variation of the category of land use and applying for leasehold extension before its expiration (Tan, 2018).

The transaction process of the sub-sales for the property (land and building) are using the Memorandum of Transfer in the form 14A transfer of land ownership to the new purchaser under the National Land Code 1965 in accordance to the procedure of endorsement and stamping at the Land Office (Pemudah, 2009).

Moreover, the property for sale was not an easy task due to housing loan facilities tightening by the central bank for properties above RM1 million and more which causes a property overhang situation in Malaysia (Rahah, Yasmin, 2020). The property data transaction of the houses will be recorded and maintained in a database by the Department of Valuation and Property Services (JPPH) in Malaysia, commonly known as Jabatan Penilaian dan Perkhidmatan Harta (JPPH ,2022). The purpose of keeping those transaction records in the property market is to determine the property market value and the expiry date of the leasehold property.

In between, the Property Market Report is published by the National Informatic Centre (NAPIC) regarding the real estate industry to allow the property investors, local council, developers, licensed valuers, estate agents, property managers and others to understand the current property market trends and status of properties development in Malaysia (NAPIC, 2022). Therefore, both databases in the property transaction and the data reported in the Property Market report will be supporting evidence for the Valuers to determine the property selling prices and the market value according to the comparable available in the real estate industry.

4.0 Literature Review

According to the Koperasi Pegawai Pentadbiran dan Pengurusan Tanah Malaysia Berhad and Department of Director General of Lands and Mines (KPPPTMNB, 2005),

leasehold extension is needed before the expiry because the lease period will be expired when the remaining leasehold period given by the State Authority exceeds the lease periods. There are times that the lease extension will require a fresh application of lease extension because of the effect of expiry will result in termination of the Land ownership and the Landlord will not have the authority to gain back the land ownership once the lease has been expired. The leasehold extension must be applied immediately before the expiry of the periods and these shall be observed during the ownership and in the title documents. There are two types of leasehold land title identified as the Registry title or certificate of title in continuation of lease and Land Office title (Mukim Lease and title issued under the previous land law in the Enactment of Malay Reserved (EMR)). The effect of lease expiry is the land will become State land and there is a requirement to make another fresh application for alienation before the expiry periods submitted by its proprietor if the landlord wishes to continue to become the proprietor of the said parcel of land (KPPPTMNB, 2005).

The leasehold extension is a procedure to extend the leasehold tenure of a Subject Property to Leasehold 30-years, 60-years and 99-years under Section 197 and 76 and 90A of National Land Code 1965 (NLC). There are three differences of the application for Section 197 and 76 or 90A of Act 56. The differences of the application for leasehold extension to 30-years, 60-years and 99-years under Sec. 197 and Section 76 and 90 A are as follows:-

According to Section 197 and Section 76 of NLC. Both sections in the Act 56 are explaining the land procedures for application of surrender and alienation for extension of leasehold period for not more than 99 years.

According to Section 90A of NLC. This section highlighted the extension of land alienated for a term of years. A notice is issued for the application under Notice 5A. The charges of payment for extension of leasehold are clearly stated in the Notice 5A.

Section 90A application is implemented in the National Land Code to expedite the process of application within 3 months and subject to a payment of full premium. No restriction of interest and registrar caveat are in the document of title. Section 197 and 76 of the NLC are implemented to reduce the tedious process of application and reduce the amount of premium charged to the applicant. Discount was given to the applicant for the above application. Maximum 30% discount was given for the onetime payment or a nominal fee of RM5,000. In this case study, the applicants were given three options to choose for leasehold extension because of the different fees charges of premiums incurred for the various types of payment options for leasehold extension. There is comparison between the numbers of years to do the leasehold extension because this can affect the premium calculation for lease extension for example 30-years, 60-years and to a maximum leasehold extension period of 99-years.

For application under Sections 197 and 76 of NLC, the land title will be endorsed with the Registrar Caveat and added to the Restriction in Interest upon payment of nominal fee. Registrar Caveat

can be deleted in the document of title upon payment of full premium during the transaction of the property. The premiums charged are based on the current land market value and the applicants are entitled for a 30% discount if they are able to pay back the premium within the first 6 months of the Notice 5A is issued. Additionally, below is the activity and duration for the Leasehold Extension within PTD Petaling extracted from PTD Petaling customer standard chartered table:

Table 1: The timeframe for each procedure in the leasehold extension as stated in the standard chartered timeline table

Description of Standard Chartered timeline in leasehold extension:	Timeline/Months:
1. Receive application for alienation under Schedule 1 for approval	5
months by Mesyuarat Jawatankuasa Teknikal Tanah Daerah Petaling	
(MJKTTDP):	
2. Process of preparation of summary notes and approval from	3 months
Majlis Mesyuarat Kerajaan Negeri (MMKN) :	
3. Process of preparation of approval letter and issuance of Notice	7 months
5A (payment duration given is due within 6 months) :	
4. Issuance of document of title :	3 months
5. Process of leasehold extension of the land. :	12 months

The time required for the property to extend to leasehold periods of 30-years, 60- years and 99years is under chartered time No. 2 and No. 3, i.e. minimum of duration of three (3) months and maximum of duration of six (6) months.

The application fee for the extension of leasehold is approximately RM50 for the application form (Jadual 1) and RM150 for the processing fee. Additional fee such as official title search at Land and Mines office, Selangor and printing cost of two (2) copy of Surveyed Plan at the Technical Department of PTD Petaling is RM50 (Land search) and RM40 (surveyed plan) each respectively.

Upon submission of the application form which is Form 12A, Appendix A and Schedule 1 the application will be processed by the PTD Petaling and within three (3) months the *Majlis Mesyuarat Kerajaan Negeri* (MMKN) will issue a notice 5A to confirm the amount of fees charges.

5.0 The formula for the Leasehold Extension Premium in the State of Selangor, Malaysia The premium for the leasehold renewal depends on the calculation of the nominal fee of approximately RM1,000 for the landlord that wishes to continue to occupy the subject property by the next of kins in the same family.

Furthermore, another calculation is the nominal value of RM5,000 payment including the entering of the restriction of interest.

Another formula is to determine the premium by the computation of the Market Value of the land with the remaining years and the number of years to extend the lease. There are an additional 30% discount for one-time payment of the premium and the leasehold title will not be endorsed with the restriction of interest (Tan, 2018).

This includes the computation of the formula calculation of premium according to the 1/4 x 1/100 x (residual of lease extension: number of years to renew *minus (-)* remaining years of lease) x land value (RM per square feet/ per square meters) x land area (square feet/square meters) of the subject property

6.0 Research Methodology

The objectives of this paper are to determine the procedures for the leasehold extension application with the district land office. Then, to determine the three (3) formula in leasehold premium calculation for leasehold extension in Malaysia. The scope of the paper is to determine the techniques and procedures to do the leasehold application. Then to suggest types of leasehold periods for extension and the premium charged for the calculation. The purpose is to ensure that the leasehold extension is successfully applied by the applicants because of the requirement to understand the procedures and to make a good judgment on how to budget the estimated premium in order to manage the lease extension requirements fees upon approval. The valuers, the estate agents and the property owners will benefit from the research because this research paper will provide insight to the reader on how to conduct a leasehold application. There is a significant contribution of knowledge development and growth in the areas of lease extension application and approval for the residential properties in Malaysia. The paper can become a source of articles to be read by Malaysian and real estate professionals in various countries to understand the types of procedures required for their leasehold extension and for the purpose of improving property ownership status and Market Value.

The method presented in this paper is a case study approach via reference to the secondary data of Sale and Purchase (S&P) Agreement from a subject property owned by a house owner belonging to our customer/landlord. The background of the subject property in the case study is a single storey detached house located at the Petaling Jaya, Selangor, Malaysia. The house owner has occupied the house inherited originally from the parents then to the siblings for about 50 years. The house condition has deteriorated because of individual design and reaching the economic lifespan of the property. The research was conducted through the actual handling of the property sale and purchase as a joint agency to conduct the sale and purchase procedure. Thereafter, the subject property was sold out by another joint agent with the buyer's purchase in cash terms. The application for leasehold extension was submitted for approval prior to the sale of the property and the leasehold extension of 60 years was granted for approval under the Notice Form 5A.

The data collection is based on three visits to the site and follow-up telephone calls with the land officer. The information collected during the site visits are the flow charts, charter timeline and the application forms documents from the land office for leasehold extension. Other data collection are application form for the leasehold extension, title search, briefing session by the land officer prior to filling up the application form, submission of the application for lease extension by the Landlord and submission of the fees charges for processing of the leasehold extension application purpose.

The data analysis is according to the standard timeline for leasehold extension application, application standard procedures, obtaining feedback plus records of the application and approval follow-up tasks. The results from the case study that have been obtained are the comparison with the scheduled timeline for the lease extension, the successful rate to obtain the approval for the leasehold extension approval and the premium amount determined for the leasehold extension in

the title of documents. The approval of the leasehold extension from the District land office is subject to the restriction of interest endorsed in the original document of title for record purposes.

7.0 Data Analysis

7.1 Standard timeline for leasehold extension application

The standard timeline for leasehold extension application is 12 months and the standard duration to receive the approval is within the period of 7 months because the duration to make the premium fees upon approval is within 6 months. The standard timeline to grant a lease extension by the land office requires a longer or lengthier process due to the meeting for approval of the letter of application has to be minuted by the Mesyuarat Jawatankuasa Teknikal Tanah Daerah Petaling (MJKTTDP). The procedure requires the involvement of technical land surveyors to do the groundwork and property surveyors to derive the property market value to determine the premium for leasehold extension.

The standard chartered timeline as shown in Table 1 outlines the standard timeframe for each procedure in the leasehold application until the approval stage and registration of title for new leasehold interest. All this information is important to give a clearer picture of the activities that are conducted in the land office. Meanwhile, the application Form 12A must be filled up accurately to provide the land office the information needed to process the application smoothly.

7.2 The application standard procedures and the feedback

The application adheres to the guidelines and procedures as stated in the National Land Code 1965. There is a process to follow-up because to understand the steps and the status of each process of approval to maintain the standard chartered timeline of procedures. There is a good way for the District Land office to keep the house owner/ applicants informed about the status of application, a yellow postcard that is stamped and written with a file number will be posted to the landlord to notify the application has been received for the process by the District Land Office.

There is also an effective and efficient service in land measurement during the processing period. The land surveyors have to perform the duty to measure the land area and the boundary and the landlord is aware of the process because she has made the application by herself accompanied by a licensed Valuer. The applicant is well informed by the explanations which were made by the land officer and the licensed Valuer during the leasehold application submission before the property leasehold extension application being tabled to the meeting for the approvals.

7.3 Records of the application and approval follow-up tasks

The land office will open a file to record and minute the application. All application information and the evidence of calculation will be kept inside the file and will be circulated to each technical department after each process of approval. Thereafter, the application will be kept in the file records and the original title is stored for safekeeping in a room that is protected from theft and loss.

8.0 Results of data collection and data analysis

8.1 The schedules timeline for the lease extension

The schedule of timeline for the lease extension is approximately eleven months in order to meet the timeline in the standard chartered. There are times when there are hiccups, the officers can be contacted through her mobile number for communication through message or phone call due to the restriction in movement control in order to work from home. Thereafter, the land officers are willing to guide and lead the valuer and landlord to meet the requirements in the application process such as providing guidelines the next step of the land office will conduct in the leasehold application approval. Each step of the leasehold application procedures were properly addressed during the process of obtaining the leasehold application approval.

8.2 The successful rate to obtain the approval for the leasehold extension approval

The successful rate to obtain the approval for the leasehold extension is higher when the forms have been filled up systematically and according to instruction. All information requested inside the application form is filled up and the submissions for approval are in accordance with the standard operating procedures. The type of the requirements is to justify the number of years for renewal, this is a selection process. The application forms have been divided into three portions including the applicant particulars, the land details, the duration for the leasehold extensions, the reason to make leasehold extension and the checklists of documents for submission with the acknowledgement by the applicant.

The premium amount determined for the leasehold extension in the title of documents upon approval of the application, the land owner is clearly directed to go to collect the letter of approval for lease extension with the premium charges stated inside the letter. The calculations for each type of premium options for payment were clearly calculated and the formulas were stated inside the approval letter of lease extension. As mentioned, there are three (3) formulas to calculate the lease extension involving the nominal value and the 30% discount due to the reason whether to sell or to continue occupying the house. Restriction of interest is incurred in the land title for properties that have lease extension by payment of a nominal value. The process is longer because there is an additional one month to obtain the approval for the transaction by the State Government.

8.3 The restriction of interest and the clause include after the lease extension

The restriction of interest and the clause included to the property owner's land title upon lease extension approval which is subject to the property owner's requirement to obtain the State Government's consent to sell the property to another new purchaser.

The restriction in interest that will be stated in the original land title is "Tanah ini tidak boleh dipajak, digadai atau dipindah milik tanpa kebenaran Pihak Berkuasa Negeri". (Translated In English is this land shall not be leased, charged or transferred before getting the consent of the State Authority).

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8.5 Types of consideration to make upon receiving the leasehold extension approval

The amount to be paid for the premium and whether to extend the leasehold period due to the reason for the premium charged for the lease extension. For a property seller, the approval for the leasehold extension will be another consideration whether to extend the property before selling. There are various factors that affect the decision to extend the leasehold after receiving the approval of application such as the willingness of the new house buyers to pay for the premium or to just continue with the current stated leasehold before the expiry below 30 years.

9.0 Conclusion of the Research

The leasehold extension application procedure requires a huge effort to complete and obtain the approval. The experience in hand-on training and coaching is very important for the Valuers in understanding the procedures to applying for the leasehold extension successfully. There are three types of factors to make in preparation for leasehold extension application immediately after getting sufficient knowledge and information to extend the leasehold periods of a property interest.

Firstly, the benefits of making an effort to apply for the lease extension are because the property ownership will be more secure and stable. The leasehold extension approval granted to the landlord will give an impact to the house buyer as consideration in negotiation for the house selling price. The lease extension is important for the leasehold interest property because the leasehold interest property will be having longer years of occupancy and enjoyment on usage of the land.

Secondly, the factors affecting the leasehold property market value will be the tenure of the property because freehold interest property has a higher value compared to the leasehold period. Other factors include time of transaction, tenure, location, category of land use, size and age of building.

Thirdly, the factors contributing to the leasehold extension approval include the motivation to sell the property in the current state of condition during the Covid-19 pandemic and having the competition from other property sellers to sell the house in the subsidiary markets.

In conclusion, the leasehold extension premium is largely affected by the variant numbers of years of lease extension periods such as 30-years, 60-years and 99-years leasehold extension. The decision to make the wise choice to choose the options for the type of leasehold extension premium calculation formulae are depended to the formula calculation in the nominal value of RM 1,000 subject to transfer to the next of kins, or RM5,000 nominal value subject to a restriction of interest and no transaction were done during the period of time and subsequently subject to a full payment of the premium upon making the decision to sell the property in a transaction, or no restriction of interests for property premium paid in one lump sum, with 30% less for the total sum premium of calculation using the leasehold extension formulae as stated in the state land rules.

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11.0 Appendix

11.1 The alienation of land under Section 76, National Land Code



(Ainul & Sharifah, 2022; ILBS, 2020a)



11.2 Title issued under the National Land Code and the Administration



11.3 Land Alienation Approval matters in notice Form 5A

There are two types of final title identified as registry title and land office title. The registry title is administered by the Registrar of Titles at the State Land Registry while the land office title is administered by the Land Administrator at the District land Office (Ainul & Sharifah, 2022; ILBS, 2020a).





Background of Sale and purchase of Property in Malaysia

11.4 Way forward in the Estate Agencies in Malaysia

There are two ways to sell the property identify as the private treaty or representation by the estate agent. There are five types of estate agency in year 2014 before the amendment of the Estate Agency Act known as the exclusive agency, sole agency, sole joint agency, joint agency and ad-hoc basis or and open-listing (BOVAEAPM, 2020; BOVAEAPM, 2014; BOVAEA, 1999).

Five types of Estate Agencies in Malaysia, stated by Estate Agency Standard prior to 2014:

- i) exclusive agency,
- ii) sole agency,
- iii) sole joint agency,
- iv) joint agency and
- v) ad-hoc basis or open-listing

Four types of Estate Agencies in Malaysia, stated by Estate Agency Standard in 2020:

- i) exclusive agency,
- ii) sole agency,
- iii) joint agency and
- iv) ad-hoc basis or open-listing

(The Estate Agent standard have removed the Sole joint agency because the fee is pre-agreed formula from the principal and having the advantage to compensate other estate agents) **11.5 Types of Estate Agencies in Malaysia according to the Estate Agencies Standards** The definition of the estate agency for five types according to the Estate Agencies Standard 2014 and 2020 are listed as below:

(BOVAEAP, 2020 and BOVAEA, 2014 and BOVAEAP, 1999

1/4 x 1/100 x (residual of lease extension) x land value (RM per square metres) x land area (square metres) of the subject property

11.6 The formula for the Leasehold Extension Premium in the State of Selangor, Malaysia

The computation of the formula calculation of premium in the State of Selangor according to the State Land Rules.

Five (5) type	The nature of the estate agencies practices and definitions	
of listings		
i) Exclusive	i) Only a single estate agent is appointed to act on behalf of the	
agency	principal.	
	ii) The appointed estate agent gets the right to close the transaction	
	although other parties make the introduction.	
	iii) The estate agent is entitled to be paid the agreed fee even if he is	
	not the effective cause of the transaction.	
ii) Sole	i) Only a single estate agent is appointed to act on behalf of the	
Agency	principal.	
	ii) The principal may, however, reserve the right to close deals on his	
	own although the estate agent has made the introduction. In such	
	case, the principal is not obligated to pay over and above the	
	introduction.	
	iii) Alternatively, where the principal play an active role, an	
	arrangement for discount in fees may be made.	
iii) Sole joint	i) The agent and principal works together as a team and the fee is	
agency	divided on a pre-agreed formula and the principal has the flexibility	
	to compensate additional estate agents and at the same time	
	maintain the advantage of having one estate agent under control.	
iv) Joint	i) More than one agent is appointed and only the estate agent who	
agency	closes the deal gets paid.	
	ii) The number of estate agents appointed is limited and each is	
	aware of the appointment of the others.	
v) Ad-hoc	i) The principal can engage an unlimited number of estate agents on	
basis or	an ad hoc basis.	
open-listing	ii) Fees are paid only on successful conclusion of the estate agency	
	transaction.	
Case Study: Land Area: 463.3852 sq. m. Tenure of Land : 41 years Lease Extension Tenure: Lease extension to 60 years, extension of additional 19 years. Type of house : A single-storey detached bangalow house Category of land use: Residential Location: Petaling Jaya, Selangor

Example of calculation:

11.7 The 1st Calculation Formulae:

Explanation:

The premium for the leasehold renewal depends on the calculation of the nominal fee of approximately RM1,000 for the first 3,750 square feet for the property in Selangor only. The condition is to be transfer for the next of kin.

1/4 @ 1/100 @ RM1,600 per sq m. @ (60 years - 41 years) @ (463.3852 sq. m - 348.386 sq. m) = RM8,739.90

Total premium by adding RM1,000 plus RM8,739.90 are RM9,739.90.

11.8 The 2nd Calculation formulae:

Explanation: Nominal value of RM5,000 payment including the entering of the restriction of interest. The formula is to determine the premium through the computation of the Market Value deduct from the remaining years of tenure and the number of years to extend the lease.

The premium is paid at nominal rate of RM5,000, thereafter, the customer is required to pay additional RM30,217.30 when he decided to transferred the property to the new house owner.

1/4 @ 1/100 @ RM1,600 per sq m. @ (60 years - 41 years) @ 463.3852 sq. m: RM35,217.30

11.9 The 3rd Calculation formulae:

An additional 30% discount for one-time payment of the premium and the leasehold title will not be endorsed with the restriction of interest (Tan, 2018).

For example,

1/4 x 1/100 x RM1,600 per sq m. x (60 years - 41 years) x 463.3852 sq. m

= RM35,217.30 less 30%

= RM24,652.10

Akauntan Negara Malaysia for measurement fees and surveyed land for the final title RM285.00 Pengarah Jabatan Pengairan dan Saliran Negeri Selangor total RM1,145.00 for infrastructure of drainage.

Notice of Quit Rent payment	
* Obtaining the first year quit rent	RM 151.00
Premium (first method)	RM24,652.10
Premium (second method)	RM5,000.00
*Measurement Fees (without surveyed boundary)	RM250.00
Surveyed the boundary	RM25.00
*Preparation and registration	RM100.00
(i) qualified title documents and continuation of	
Final title	
(ii) Final title documents	RM10.00
Other charges	
(i) Application	RM -
(ii) Notice	RM20.00
(iii) Special premium	RM -
Total (Method 1)	RM 25,208.10
Total (Method 2)	RM 5,556.00

* Ordered given under the Section 81/82/90A National Land Code.

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LOW PARTICIPATION OF LOCAL SKILLED WORKERS IN MALAYSIAN CONSTRUCTION INDUSTRY:

TIME FOR IMPROVEMENT

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Abstract

Malaysia has struggled with a scarcity of local skilled workers in the building industry. This poses challenges in maintaining quality, productivity, and competitiveness. This also led to a high employment rate of unskilled foreign workers, which contributes to social problems and lower construction standards. With the rapid growth of Industrial Revolution 4.0 (IR 4.0), there is a pressing need to enhance the participation of local skilled workers in the Malaysian construction industry to meet technological demands and improve overall industry performance. This paper intends to identify the key factors of low participation of local skilled workers in the Malaysian construction industry; to determine the impacts brought on by the low participation of local skilled workers in the Malaysian construction industry; and to investigate whether the proposed strategies are effective in addressing the low level of local skilled workers participation in the Malaysian construction industry. This study used an academic research and quantitative method via a questionnaire survey. The targeted respondents for this research were construction professionals from G7 contractor companies in Malaysia's Northern Region, and a total of 94 responses were obtained. The outcome of this study shows that the majority of respondents agreed with all the key factors do contribute to the low participation of local skilled workers and all the impacts do bring on by the issue and affect the Malaysian construction industry. For the strategies, most of the respondents have strongly agreed that among all the mentioned strategies, improve the working conditions and safety practices and incentives and rewards system are the most effective in addressing the issue. In summary, this study would serve as a guide for the employers to take the necessary proactive action to increase local skilled workers and ensure the performance and competitiveness of Malaysia's construction industry.

Keywords: Malaysia; construction industry; skilled; local workers; low participation rate.

1.0 Introduction

In 1980s and 1990s, the construction industry in Malaysia began to thrive, which increased the country's income, work opportunities, and infrastructure development, all of which helped the gross domestic product (GDP) to grow in Malaysia (Dehdasht, 2022). (Khan, 2014) also concurred that Malaysia's building industry has boosted the nation's economy and drives its development. As per Ibrahim (2010), for the nation to flourish and move closer to its objective of being a developed country, the construction industry is essential. Malaysia is expected to evolve into a high-income and developed country as a result of the eleventh Malaysia Plan (11 MP), the twelfth Malaysia Plan (12 MP) and Economic Transformation Program (ETP) (Mohd Fateh, 2022). None of these accomplishments would be possible if there is no workforce such as the construction workers in the construction industry.

In Malaysian construction industry, the employers will use both foreign workers, typically unskilled and local workers, typically skilled to complete tasks at construction sites for a construction project (Mohd Najib, 2019). However, the construction industry in Malaysia is severely challenged by a scarcity of local skilled workers (Olanrewaju, 2017), due to the well-known characteristics in construction industry such as low wages, 3D syndrome that is, difficult, dirty, and dangerous, project-based and little opportunities for career advancement (Mohd Najib, 2020).

Due to the low level of local skilled workers participation, Malaysia is now excessively dependent on many foreign workers that could lead to social and safety problems (Syed Jamalulil, 2022). Unskilled foreign workers have made a significant contribution to filling the labour scarcity in the national construction industry. This is impossible to refute. However, in compliance with the National Construction Policy 2030, it is necessary to reskill, upskill and increase accredited skilled workers in the construction industry. Malaysia's construction industry needs to keep up with technological advancement such as Industrialized Build Systems (IBS), Building Information Modelling (BIM), modular construction, the Industrial Revolution 4.0 (IR 4.0) technologies, etc to do the work, so that the quality and productivity can be improved as well as preserve the construction industry's modernity and competitiveness (Malaysian Bureau of Labour Statistics, 2022). It will need skilled workers to handle all of these due to the possibility that the work will not be handled well by the unskilled foreign workers (Ibrahim, 2022). As a result, employers such as contractors must seek to address the problems and boost involvement and recruiting local skilled workers in construction industry in Malaysia.

The research objectives are 1) to identify the key factors of low participation of local skilled workers in the Malaysian construction industry, 2) to determine the impacts brought on by the low participation of local skilled workers in the Malaysian construction industry, and 3) to investigate whether the proposed strategies are effective in addressing the low level of local skilled workers participation in the Malaysian construction industry.

2.0 Literature Review

2.1 Definition of Key Terms

2.1.1 The Construction Workers

Construction workers are crucial elements that are required to carry out the tasks in the industry. Unskilled and skilled workers are two groups of the construction workers (Mohd Fateh, 2022). Unskilled workers, often with minimal education, are typically assigned to tasks in construction that do not demand specialized skills or experience, such as site clearing, material transport, etc (Kagan, 2022). They received with low wages for their works because of this (UKEssays, 2017). On the other hand, skilled workers are a number of workers with a high skill level who provide substantial contribution to the economy through their work (Hayes 2022). They typically have higher levels of education and obtain a SKM with level three. Therefore, skilled individuals will use their knowledge and expertise to complete more complicated tasks including painting, plastering, etc. Due to this situation, skilled workers will pay with high wages (UKEssays, 2017). In the Malaysian construction industry, skilled workers are typically local workers whereas unskilled workers are typically foreign workers (Mohd Najib, 2019).

2.1.2 The Local Skilled Workers in the Malaysian Construction Industry

A local worker is a person employed in the country of which they are a citizen (Law Insider). In Malaysia's construction industry, local workers are defined as skilled workers who do skilled tasks on construction sites as compared to foreign workers (Manap, 2017). They are the ones with a higher education, an apprenticeship, who have acquired skills and experience with complicated jobs in the construction industry. In light of this, their duties include operating equipment (plant operators), painting (painters), welding (welders), laying bricks (bricklayers), and other skilled jobs in construction sites. Their contributions have a significant impact on the product's quality (Salleh, 2020).

2.2 An Overview of the Malaysian Construction Industry

The construction industry serves as a platform for advancing construction processes. Integral to this advancement is the interconnection of electrical, structural, civil, and mechanical

infrastructure, which occurs concurrently with the building process (Mohd Fateh, 2022). Stakeholders from construction companies, consultant firms, suppliers, financial institutions, and construction firms play crucial roles in this process. Key elements such as equipment, manpower, management, and construction materials are essential components. Additionally, considerations of cost, scope, time, and performance are paramount (Mohd Fateh, 2022). Malaysia's construction industry is pivotal for economic growth, contributing to improved living standards and national development (Khan, 2014). The NCP 2030, introduced by the Ministry of Works (MoW) Malaysia, states that the construction sector will go digital and encourage stakeholders to recognise new technologies that increase output and efficiency and transform the industry into an intelligent and sustainable one. This necessitates a competent workforce to ensure the industry's long-term viability (Ibrahim, 2022).

2.3 The Necessitates of Local Skilled Workers in the Malaysian Construction Industry

Datuk Dr Syed Hussain Syed Husman, president of the Malaysian Employers Federation, reports that only 28% of the current workforce in Malaysia's industry are skilled workers. To reach the goal of becoming a developed country by 2030, at least 45% of the workforce must be skilled (Singh, 2022). The reluctance of locals to engage in the construction industry, particularly on-site work, can be attributed to the 3D's syndrome – work perceived as dangerous, dirty, and difficult (Marhani, 2012). Additionally, Mohd Fateh (2022) note that many Malaysians prefer to work overseas, attracted by better opportunities and higher wages, leading employers in Malaysia's construction industry to rely on unskilled foreign workers. This reliance poses various challenges, including a negative impact on Malaysia's construction industry reputation, financial outflows, low-quality construction output and so on (Mohd Najib 2019). Moreover, it hinders efforts to promote automation, mechanisation, and the creation of skilled employment opportunities (Ibrahim, 2022). The transition to technology-driven processes requires skilled workers, as highlighted by Syed Jamalulil (2022), emphasizing the importance of local workforce development to meet the industry's demands.

2.4 The Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 2.1 shows the 5 key factors of low participation of local skilled workers in the Malaysian construction industry that has been identified by the researcher based on the previous research. (i.e., Education factors, Management and organisation, General impression of construction industry, compensation and benefits and long-term employment prospects).

Table 2.1: Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Key Factors		Authors
Education Factors	Higher Education Level	Valitherm (2020), Mohd Fateh (2022)
Managementand	Monopoly of Foreign Workers	UKEssays (2017), Mohd Najib (2019)
Organisation	 UnsatisfactoryWork 	& Mohd Najib (2020), Valitherm
	Environment	(2020), Mahmood (2021), Mohd Fateh
	 Lack of Training and 	(2022)
	Skill Formation	
General	Poor Image of Construction	UKEssays (2017), Mohd Najib et al.
Impression of	Industry	(2019) & Mohd Najib (2020),
Construction	3D Factors	Valitherm (2020), Mahmood (2021)
Industry		
Compensationand	• Low Wages for Local Skilled	UKEssays (2017), Mohd Najib (2019)
Benefits	Workers	& Mohd Najib (2020), Valitherm
	• Poor Welfare in Construction	(2020), Mahmood (2021), Mohd Fateh
	Industry	(2022)
Long-Term	Limited Career Path	Mohd Najib et al. (2019) & Mohd Najib
Employment	 Temporary Employment 	(2020), Valitherm (2020)
Prospects	Status	

2.4.1 Education Factors

Education factors will occur because many locals and the young generation in Malaysia now possess greater levels of education, leading them to doubt their suitability for employment in the construction industry.

2.4.1.1 Higher Education Level

Valitherm (2020) identifies education level as a major factor contributing to low local participation in the construction industry. As more young people pursue higher education, they perceive themselves as more capable, leading to job selectivity. Many prefer air-conditioned office jobs than in the sweltering, unclean conditions of a construction site. While Mohd Najib (2019) notes this trend worsens with higher education attainment, as locals seek better living standards. Also, Malaysians seek lucrative opportunities abroad, meticulously selecting jobs matching their qualifications (Mohd Fateh, 2022).

2.4.2 Management and Organisation

Management and organisation in the construction industry must be effective. It is crucial to give workers a pleasant and efficient workplace because doing so will help them stay on the job longer and draw in extra workers as well as maintain high quality and productivity due to an effective management and organisations (Hussain, 2020).

2.4.2.1 Monopoly of Foreign Workers

Mohd Fateh (2022) highlights the heavy reliance of the Malaysian construction industry on foreign workers from Bangladesh, Nepal, etc, leading to a perception of foreign dominance in the labor force. Local skilled workers face pressure to compete with foreign workers for employment opportunities. Another previous research also stated that because of the massive influx of foreign workers into Malaysia, contractors were indirectly encouraged to hire them due to their less selective about the work they performed and were ready to accept low pay and unfavourable working conditions in comparison to local skilled workers. The presence of foreign workers leads to the avoidance of local skilled workers in collaboration with foreign workers in construction industry as they feel this is demeaning (Mohd Najib, 2020; Valitherm, 2020).

2.4.2.2 Unsatisfactory Work Environment

According to Mohd Fateh (2022), they revealed that unsatisfactory work environment in construction industry contributes to the low level of competent local workers participation. This is because unsatisfactory work environment in construction industry normally comes with a problem comprehending the approach and process, a filthy workplace, and hazardous working conditions. On the construction site, a lot of accidents will occur. Lack of safety procedures may result in accidents. The construction industry commonly encounters all of these situations. If the local skilled workers work in the construction industry, they will then experience stress, discomfort, and exhaustion.

2.4.2.3 Lack of Training and Skill Formation

As per UKEssays (2017), lack of training and skill formation has been cited as a factor influencing the engagement of local skilled workers in the construction industry. Many lack practical experience, especially local youth transitioning from education to work. This is due to the fact that during school time, schools prioritize theory over practice, and industrial training programme often fall short in duration and experience. All of these are contributed to poor skill of local youth. Moreover, Valitherm (2020) also has explored this factor. Yet, it only ranked as one of the least influential factors in the studies as the respondents think that the locals who will be lack of training before work may be less.

2.4.3 General Impression of Construction Industry

The construction industry has a poor image in the view of local workers, and the 3D factors make the scenario of local skilled workers participating in building industry more serious. The construction industry is diminishing the interest of the local skilled workers.

2.4.3.1 Poor Image of Construction Industry

Valitherm (2020) and UKEssays (2017) highlighted the poor image of construction industry does affect the participation of local skilled workers. The local skilled workers have a negative perception of the industry as a result of a consequence of a growing reliance on foreign workers. The construction industry loses quality when only low-value tasks are carried out. The hiring of foreign workers may also enhance undesirable behaviours like crime, a particular culture, or foreign workers' illegal strikes, which could create uncertainty. Consequently, the construction industry has a negative reputation, which has a direct impact on the low level of local skilled workers engaged in the industry.

2.4.3.2 3D Factors

Based on the studies conducted by Mohd Najib (2019), the construction industry has long been linked to 3D images. This made it impossible to hire enough local skilled workers to achieve the rising demand for labour. Next, it is also claimed by Mohd Najib (2020) that the respondents concurred that 3D causes local skilled workers to become discouraged from working in the construction industry as they will feel unsecure if they do so in such a difficult, dirty, and dangerous environment. Local skilled workers believe that many of the jobs in the construction industry are unsafe. These are visible from much news. If they work in unsafe conditions, they pose a significant risk (Mahmood, 2021).

2.4.4 Compensation and Benefits

Compensation and benefits packages including bonuses, welfare, insurance, and the like are crucial since they can be a key factor in attracting and keeping local skilled workers in the building industry (Ilmi, 2019).

2.4.4.1 Low Wages for Local Skilled Workers

Mohd Fateh (2022) claims that local skilled workers prefer to look for opportunities to work abroad to earn higher wages than Malaysia. This is because the wages paid to the local skilled workers in Malaysia are relatively low. According to UKEssays (2017), the wages of Malaysia's site workers are regarded as poor. The local skilled workers are likely to request higher salary for them. Yet, the employer such as the contractor would rather hire foreign workers as they accept low wages. Due to the need for high salaries, local skilled workers were drawn to

foreign nations like Singapore, Taiwan, and Japan. Based on their skills, they received a substantially larger wage in that instance.

2.4.4.2 Poor Welfare in Construction Industry

Local skilled workers nowadays are more intelligent, knowledgeable, and are aware of what is best for them (Valitherm, 2020). They are unwilling to enter the construction industry due to the inadequate welfare as they are aware of its negative effects to them (Valitherm, 2020). In Malaysia's construction industry, contractors frequently provide workers with temporary facilities, services and accommodation on the job site. Most of the local skilled workers found this form of welfare to be less than ideal (UKEssays, 2017).

2.4.5 Long-Term Employment Prospects

Everyone will undoubtedly take their career prospects into account in order to live a better life. Construction workers are not exempt from this requirement. However, the local skilled workers are being discouraged from entering Malaysia's construction industry by the lack of long-term employment prospects. This is due to the fact that the industry is well known for having a temporary employment status and limited opportunities for workers to grow in their careers (Mohd Najib 2019, 2020; Valitherm, 2020).

2.4.5.1 Limited Career Path

The local skilled workers are limited to perform the same tasks; they are unable to advance and develop in their careers in construction industry (Mohd Najib, 2019). The limited career path in construction industry have made it less attractive to the local skilled workers as they have a better level of job expertise. They desire opportunities that will be advantageous to them (Mohd Najib, 2020).

2.4.5.2 Temporary Employment Status

Construction industry employment is typically contract- or project- based. The contract will come to an end once the construction project is complete (Mohd Najib, 2020). Hence, the local skilled workers are reluctant and show little enthusiasm in participating. They prefer jobs that come with a permanent employment status which guarantees them a steady salary and a more secure career path (Mohd Najib, 2020). Besides, Mohd Najib (2019) also explained that the local skilled workers frequently choose permanent employment with stable pay and insurance coverage as a security for their future.

2.5 The Impacts Brought on By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 2.2 shows the researcher, who has identified 4 impacts brought on by the low participation of local skilled workers in the Malaysian construction industry from the findings of past research.

Table 2.2: Impacts Brought on By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Impacts	Authors
Dependency of Foreign Workers	Valitherm (2020)
Low Quality of Works	UKEssays (2017), Valitherm (2020)
Delay in Work	UKEssays (2017), Valitherm (2020)
High Construction Costs	UKEssays (2017), Valitherm (2020)

2.5.1 Dependency of Foreign Workers

Datuk Seri Mustapa Mohamed, a minister in the Prime Minister's Department (Economy), asserts that Malaysia must encourage locals to participate in the construction industry while acknowledging the necessity for foreign employees in order to decrease the country's reliance on foreign workers (The Star, 2022). Employers have difficulty in finding interested local skilled workers. The Malaysian Employers Federation also stated that the social stigma attached to the 3D nature of the job was another reason why locals refused to work in this area (Kumar, 2016). Thus, the employers will prefer to employ foreign workers who are not choosy and are willing to take up the work opportunities to perform construction-related tasks (Valitherm, 2020).

2.5.2 Low Quality of Works

Foreign workers imported to Malaysia are typically referred to as unskilled workers or workers with limited construction knowledge (Valitherm, 2020). In the construction industry, this has impacted both production and quality. The foreign workers need guidance from employers to do the construction work. If not, they may produce improper or low-quality work (Oke, 2017). Hussain (2020) added that the performance and quality of a construction project in developing nations are significantly impacted by the presence of unskilled workers. The findings further demonstrated the significance and necessity of skilled workers in the construction industry, since their participation improves project performance and quality, which in turn increases project success rates.

2.5.3 Delay in Work

Workers with specialised knowledge were needed to handle the technology. The fact that most foreign workers lack the necessary skills (Valitherm, 2020). There are also lack of local skilled workers working in Malaysia's building industry. Consequently, unskilled foreign workers are compelled to fill roles requiring specialized knowledge, necessitating time-consuming training. The foreign workers would not start contributing to the company until after seven to eight months of on-the-job training. To some extent, some of the training may be difficult. Thus, the majority of foreign workers might be reluctant to go through training. They were also concerned about losing money if they go for training because they were paid daily (UKEssays, 2017). The work schedule may be impacted by the lengthy training period and the foreign workers' resistance to cooperate.

2.5.4 High Construction Costs

The hiring of foreign workers drives up construction costs because there are numerous expenses that must be incurred for them. As an illustration, the unskilled foreign workers must attend the training in order to do the work that requires expertise (Valitherm, 2020). Hence, the cost of training has increased substantially. Besides, medical examinations, transportation, and levies also come at a high expense (UKEssays, 2017). The employers have to take the responsibility to ensure that the foreign workers are in good health and are available to come into the construction industry.

2.6 The Proposed Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry

Table 2.3 shows the 7 strategies in addressing the low level of local skilled workers participation in the Malaysian construction industry has been identified from the findings of past research. (i.e., Provide a good welfare, Improve working conditions and safety practices, incentives and rewards system, minimum wage system, promote labour-intensive construction with Industrial Building System, awareness of career opportunities and government recruitment policies).

Table 2.3: Proposed Strategies in Addressing the Low Level of Local Skilled WorkersParticipation in the Malaysian Construction Industry

Strategies	Authors		
Provide A Good Welfare	Manap (2017)		
Improve the Working Conditions and Safety	Mohd Najib (2019) & Mohd Najib (2020),		
Practices	Valitherm (2020), Mohd Fateh (2022)		
Incentives and Rewards System	Manap (2017), Mohd Najib (2019) & Mohd		
	Najib (2020), Valitherm (2020)		
Minimum Wage System	UKEssays (2017), Mohd Najib (2019) & Mohd		
	Najib (2020)		
Promote Labour-IntensiveConstruction with	Mohd Najib (2019) & Mohd Najib (2020),		
Industrial Building System (IBS)	Valitherm (2020), Mohd Fateh (2022)		
Awareness of CareerOpportunities	Mohd Najib (2019) & Mohd Najib (2020),		
	Mohd Fateh (2022)		
Government Recruitment Policies	Mohd Najib (2019) & Mohd Najib (2020),		
	Mohd Fateh (2022)		

2.6.1 Provide A Good Welfare

Manap (2017) states that good welfare can motivate and enhance productivity as well as attract local skilled workers to the construction industry. However, many construction industries lack good welfare, indicating the lack of consideration for construction workers. Construction workers, particularly local skilled workers, will ponder whether they should stay employed in this unempathetic industry that offers poor welfare. Poor welfare is unable to draw local skilled workers who are seeking comfort and security (Manap, 2017). Hence, the employer should provide good welfare to the construction workers in construction industry in Malaysia in order to attract local skilled workers by thinking about the accessibility of welfare such as the facilities, the location, and their maintenance during the planning and preparation phases. With this, the health and wellness of construction workers may be improved, and a lot of occupational disorders can also be prevented.

2.6.2 Improve the Working Conditions and Safety Practices

According to Mohd Najib (2019, 2020), if the employers wish to increase the local skilled worker's involvement in the construction industry, they must improve workplace conditions and safety practices. This is because the majority of local skilled workers assess their own competency and risk awareness highly for the positions they are seeking. Therefore, it is crucial that employers play a significant role in enhancing workplace safety procedures to

prevent threats to their workers' health and safety. For instance, introduce more standard safety equipment in construction sites, guarantee a respectable working environment, the "green card" course, and much more. These will augment local skilled workers' confidence in joining the building industry (Mohd Fateh, 2022).

2.6.3 Incentives and Rewards System

Incentives and rewards may be the most efficient way to attract competent local workers to engage in industry. Everyone likes money, thus using incentives and rewards system such as the appropriate amount of benefits, bonuses, incentives, and other things, can encourage and motivate people to engage in the building industry, especially local skilled workers as well as achieving organisational goals. The local skilled workers would feel valued and better equipped to envision a future in industry (Manap, 2017; Mohd Najib, 2019, 2020; Valitherm, 2020).

2.6.4 Minimum Wage System

According to UKEssays (2017), the construction industry should be established a minimum wage system to set different wages for local skilled workers and foreign workers. The local skilled workers will believe that they are more knowledgeable and competent than foreign workers, they should be paid more. Employers can use the minimum wage system to determine or increase the optimal wage for local skilled workers in accordance with their level of expertise. With the minimum wage system, the lowest paid workers also can keep up with the rising cost of living in the new era. Malaysia might then stop depending on foreign labour and boost the proportion of local skilled people who take part in the industry (Mohd Najib, 2019, 2020).

2.6.5 Promote Labour-Intensive Construction with Industrial Building System (IBS)

The Industrial Building System (IBS) should be encouraged to be implemented in the construction industry. Local skilled workers can benefit from a favourable and regulated environment with the introduction of IBS. The productivity of the building industry may also increase as a result (Mohd Fateh, 2022; Mohd Najib 2019, 2020). However, Valitherm (2020) obtained the finding that the implementation of IBS came in last place overall. This may be due to the fact that the labour-intensive conventional building system are frequently used in construction industry in Malaysia.

2.6.6 Awareness of Career Opportunities

Mohd Fateh (2022) contends that it is crucial to foster young people's desire in working in the building industry while they are pursuing their university educations by inviting the industry players to give a positive "motivational speech" to the students, highlight the successful stories, the possibility for career enrichment and growth in the construction industry, and so forth. Most of the younger generation in higher education is viewed as local skilled workers. Similarly, Mohd Najib (2019, 2020) draw the conclusion that the government's engagement is essential since they may promote employment prospects through campaigns to persuade the populace to join the construction industry.

2.6.7 Government Recruitment Policies

Mohd Fateh (2022) and Mohd Najib (2019, 2020) have stated that the government recruitment policies can affect the availability of competent local employees in Malaysia's construction industry. Changes in recruitment policies can cut down the number of foreign workers with low skill levels. It has an impact on how foreign workers see the construction industry. This can make them less desirable and less engaged in the building industry. The local skilled workers can be attracted, and Malaysia would gain benefit from the adoption of consistent, coordinated, and well-aligned government policies as well.

3.0 Methodology

3.1 Research Methodology Process

3.1.1 Research Approach and Design

A quantitative method has been adopted in this research. This method was excellent for thorough research among a big demographic group. The questionnaire survey can do predetermine settings which are more accurately specified during data collecting and analysis. The variables of this research were the key factors, impacts and effectiveness of strategies in addressing the low participation of local skilled workers in the Malaysian construction industry. This is due to a lack of research on the key factors and impacts from the standpoints of employers in Malaysia's Northern Region. There is also lack of research on the effectiveness of strategies to be used in construction industry.

3.1.2 Research Population and Sampling

In this research, the population is the employers which are the construction professionals from G7 contractor companies in Malaysia's Northern Region, including Penang, Kedah, Perak and Perlis who have registered with the CIDB because they are more likely to adopt technologies such as BIM, drones, virtual reality, etc., which require for a sizeable skilled workforce to

operate, manage, and collaborate on projects. The population is around 1124 companies, 240 in Kedah, 573 in Penang, 277 in Perak and 34 in Perlis. A probability sampling with simple random sampling is used, which guarantees that everyone in the sampled population has a fair opportunity to be chosen as a respondent and lowers the possibility of human bias during sample selection. With the sample size of 285 to 291 people, this research has been set to a good survey response rate, 30% which range from eighty-six (86) to eighty-eight (88) respondents.

3.1.3 Designation of the Questionnaire

In order to collect the data, the questions for the questionnaire have to be developed. The questions are divided into 4 sections such as:

1) Section A - Demographic Profile of Respondents

The respondent will be asked regarding their background such as years of working experience in the construction industry, academic qualifications, position, and state of workplace.

2) Section B – Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry.

The respondent will answer further on the key factors by rating their opinions on the scale ranging from strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). An optional open-ended question about additional factors also offered for the respondents to answer.

3) Section C – Impacts Brought On By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry.

The next question will be asked regarding the impacts. It has the same answering method with Section B through rating and also an optional open-ended question about additional impacts.

4) Section D - The Effectiveness of the Proposed Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry.

The respondents will be asked on the effectiveness of the proposed strategies in addressing the low level of local skilled workers participation in the Malaysian construction industry. It has the same answering method as well, by rating their opinions on the scale ranging and answer an optional open-ended question about additional strategy that is effective.

3.1.4 Pilot Study of Questionnaire Survey

As soon as the questionnaire was created, the researcher conducted a pilot study. With this, any faults or weaknesses can be identified in the research instrument before it is used for the actual research study (Hassan, 2006). The G7 contractor companies in Penang, Kedah, Perak and Perlis were the participants of the pilot study for this research by sending the Google Form, a prepared questionnaire for them to answer through email or messaging apps like WhatsApp. A total of ten responses were obtained for pilot study, and no other modifications to the questionnaire survey were performed as there is no faults were found based on the feedback received from the targeted respondents.

3.1.5 Data Collection

The questionnaire survey was created through digital platform like Google Form. The targeted respondents received the questionnaire survey via social media, email, and messaging apps. It was convenient and adaptable to use this type of data collection method as the targeted respondents can simply click the link on a desktop, smartphone, tablet, or other suitable device to answer the questionnaire survey from anywhere. Besides, the data was automatically saved, make further review and data interpretation easier.

3.1.6 Data Analysis

After gathering the data, Statistical Package for Social Science (SPSS) programme was used to compute the analysis in this research. The first section that were analysed was Section A, Demographic Profile of Respondents. The frequency analysis were applied to analyse the data as it can produce clear-cut and simple to comprehend results. Following that, the descriptive analysis, mean and standard deviation (SD) were used to analyse the data for the next section, Section B, which examined the key factors of the low participation of local skilled workers in the Malaysian construction industry, Section C, which examined the impacts brought on by this low participation and Section D, which examined the effectiveness of the proposed strategies in addressing the low level of local skilled workers participation in Malaysian construction industry. The mean represents the average point in the data set, while the SD illustrates how much difference there is from the mean (Hayes, 2022). The mean and standard deviation can be interpreted as follows:

Likert-Scale Description	Likert-Scale	Likert Scale Interval
Strongly disagree	1	1.00 - 1.80
Disagree	2	1.81 - 2.60
Neutral	3	2.61 - 3.40
Agree	4	3.41 - 4.20
Strongly agree	5	4.21 - 5.00

Table 3.1: Interpretation of 5-Point Likert Scale Measurements

Source: (Nyutu et al., 2020)

Table 3.2: Interpretation of Standard Deviation

Standard Deviation	Consensus Level		
0 ≤ X < 1	High level of consensus		
1 ≤ X < 1.5	Reasonable/ fair level of		
	consensus		
1.5 ≤ X < 2	Low level of consensus		
2 ≤ X	No consensus		
Source: (Hana & Makandla, 2021)			

Source: (Hans & Mnkandla, 2021)

4.0 Analysis and Discussions Of Findings

4.1 Response Rate

The information of data collection for this research is summarised in Table 4.1.

Table 4.1 Information of Data Collection

Aspects	Description			
Data collection period	7 weeks (17 th April 2023 to 4 th June 2023)			
Targeted respondents	The construction professional from G7 contractor companies in Malaysia's Northern Region			
Platform	Online (Google form)			
Distribution methods	Email, Whatsapp, Messenger and LinkedIn			
Response rate	Expected: 30% - 86 respondents Actual: 33% - 94 respondents			

4.2 Respondent's Demographic Profile

Based on Table 4.2, most of the people were general contractors (33%, or 31 respondents). The least number of respondents were C&S engineer and operational manager with only 1 respondent, or 1.1% out of all the respondents. The majority of respondents were holding Bachelor's Degree as their highest academic qualifications, with 76.6% or equal to 72 respondents. The group of respondents with 5 years or less of experience in the construction industry accounted for the highest percentage of respondents (30.9%, or 29 respondents). 42 respondents, or 44.7% of the total number of respondents, answered to the questionnaire survey, indicating that many respondents worked in Penang.

Position	Frequency	Percentage (%)
General Contractor	31	33
Project Manager	10	10.6
Site Supervisor	15	16
Site Engineer	18	19.1
Safety Manager	8	8.5
Others		
1. Quantity Surveyor	3	3.2
2. Contract Manager	2	2.1
3. Safety Supervisor	3	3.2
4. Project Engineer	2	2.1
5. C&S Engineer	1	1.1
6. Operational Manager	1	1.1
Total	94	100.0
Highest Academic Qualifications	Frequency	Percentage (%)
Diploma	8	8.5
Bachelor's Degree	72	76.6
Master's Degree	12	12.8
Others		
1. SPM	1	1.1
2. High School	1	1.1
Total	94	100.0
Years of Working Experience in the	Frequency	Percentage (%)
Construction Industry		
5 years or less	29	30.9

6 to 10 years	25	26.6
11 to 15 years	28	29.8
16 years and above	12	12.8
Total	94	100.0
State of Workplace	Frequency	Percentage (%)
Penang	42	44.7
Kedah	23	24.5
Perak	18	19.1
Perlis	11	11.7
Total	04	100.0

4.3 Findings on The Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

In this section, the statistics on the key factors of low participation of local skilled workers in the Malaysian construction industry were analysed and discussed. The additional factors that some of the respondents have brought up are also further emphasised.

4.3.1 The Additional Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 4.3 shows the additional factors of low participation of local skilled workers in the Malaysian construction industry that have been provided by the respondents. There are 5 responses, where each additional factor received a response from one respondent.

Table 4.3: The Additional Factors of Low Participation of Local Skilled Workers in theMalaysian Construction Industry

Theme	Additional Factors	Frequency
Management and	Management itself.	1
Organisation		
Compensation and	Low salary for heavy workload and attractive	1
Benefits	pay in other countries.	
Birth Rate	Reduction in birth rate in Malaysia.	1
Education	Local skilled workers are picky and paid higher.	1
Family Conflicts	Local skilled workers' family see construction wor	1
	as not educated people job.	
	Total	5

Table 4.3 shows that management itself was responsible for the low participation of local skilled workers in the Malaysian construction industry. Good management will improve job satisfaction if the employer and employees have cordial and helpful connections (Frye, 2020; Hussain, 2020). Following that, low salary for heavy workload and attractive pay in other countries are another additional factor that proposed by the respondents. The construction industry pays its workers a poor wage. Due to this, local skilled workers may relocate to other nations in search of employment with more competitive pay (Mohd Fateh, 2022). Furthermore, the reduction in birth rate has been removed as it is irrelevant to the issue. In addition, the statement of "For my experience, the industry itself is also reluctant to hire local workers because they are picky and paid higher" from the respondent is consistent with the previous research conducted by Valitherm (2020) and Mohd Fateh (2022). As more local and young people enrol in higher levels of education, knowledge, and skills, they develop the perception that they are more talented than others, which enables them to be selective in the positions they apply for. Family conflict is the respondent's last idea for additional factors. Many people have no desire to work in the construction industry because their family see construction workers as not educated people job. Local skilled workers have been impacted in their thinking. This claim is supported by Cao (2020).

4.3.2 The Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 4.4 shows the key factors of low participation of local skilled workers in the Malaysian construction industry. There are a total of 5 key factors, each of which has its subfactors. The responses of all respondents were evaluated by using a 5-point Likert scale, ranging from strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). Mean value that has the value more than 3.40 indicates the higher agreement from the respondents on the factor.

Statement	N	Mean	SD	Ranking
Compensation and Benefits	94	4.32	.819	1
Low Wages for Local Skilled Workers				
Compensation and Benefits	94	4.31	.804	2
Poor Welfare in Construction Industry				
Education Factors	94	4.10	.704	3
Higher Education Level				

Table 4. 4: Statistics of The Key Factors of Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Management and Organisation	94	4.03	.796	4
Unsatisfactory Work Environment				
General Impression of Construction Industry	94	3.99	.922	5
3D Factors				
Long-Term Employment Prospects	94	3.89	.848	6
Limited Career Path				
Long-Term Employment Prospects	94	3.86	.811	7
Temporary Employment Status				
Management and Organisation	94	3.78	.844	8
Lack of Training and Skill Formation				
Management and Organisation	94	3.77	.739	9
Monopoly of Foreign Workers				
General Impression of Construction Industry	94	3.64	.914	10
Poor Image of Construction Industry				

The above result demonstrates that each factor's respective mean value according to ranking: Compensation and benefits - Low wages for local skilled workers (4.32), Poor welfare in construction industry (4.31); Education factors – Higher education level (4.10); Management and Organisation - Unsatisfactory work environment (4.03); General impression of construction industry – 3D factors (3.99); Management and Organisation - Lack of training and skill formation (3.78), Monopoly of foreign workers (3.77); Long-term employment prospects - Limited career path (3.89), Temporary employment status (3.86); and General impression of construction industry – Poor image of construction industry (3.64). After analysis, the researcher has identified the top and the lowest of the factors. Most of the respondents strongly agreed that compensation and benefits, low wages for local skilled workers (M=4.32) is the key factor that highly contributed to the issue. Mahmood (2021); Mohd Fateh et al. (2022); Mohd Najib (2019, 2020); UKEssays (2017) and Valitherm (2020) stated that local skilled workers prefer to explore for possibilities to work abroad to earn greater earnings due to the relatively low wages offered in Malaysia. The lowest ranking of key factors would be the general impression of construction industry - poor image of construction industry (M=3.64). Uncertainty was expressed by some respondents, and some agreed with the idea that the construction industry's negative reputation would deter skilled local workers from participating. This is comparable to a few research (Mohd Najib, 2020 and Mahmood, 2021). While it is also distinct with previous research (UKEssays, 2017 and Valitherm, 2020). They highlighted the poor image of construction industry, including the industry's increasing reliance on foreign workers, quality declines, unfavourable behaviours like crime, a particular culture, or foreign

labourers' illegal strikes, all of which have negatively impact on the participation of local skilled workers.

4.4 Findings on The Impacts Brought On By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

In this section, the analysis and discussion of the statistics on the impacts brought on by the low participation of local skilled workers in the Malaysian construction industry will be covered. There is also the analysis and discussion of the additional impacts provided by the respondents in this section.

4.4.1 The Additional Impacts That May Brought On By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 4.5 shows the additional impacts that may brought on by the low participation of local skilled workers in the Malaysian construction industry. There are 4 responses, where each additional impact received a response from one respondent.

Table 4. 5: The Additional Impacts That May Brought on By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Theme	Additional Impacts	Frequency
Unemployment	The rising unemployment rate of local skilled	1
rate	workers.	
Economic	The Malaysian economic condition will be affected.	1
	The low participation of local skilled workers will	
	cause failure to the payments goes to the foreign	
	workers due to the reliable on the foreign workers.	
Dominance of	Locals view construction workers as a poor job,	1
Foreign Workers	which results in their minimal participation and	
	dependence on foreign workers in the Malaysian	
	construction industry.	
Higher Cost on	Poor communication between the employer and the	1
Reworking	foreign workers would result in a lot of costs	
	associated with reworking.	
	4	

According to Table 4.5, one of the respondents offered a fresh viewpoint on the potential additional impacts, namely the rising unemployment rate of local skilled workers. According to Kamarulzaman (2020), the Covid-19 pandemic was to blame for this. In 2022, Malaysia's construction industry employed 1,382,000 fewer workers in 2022 than it did in 2021 (1,385,000) (Statista Research Department, 2023). Therefore, local skilled workers will be jobless. This subsequently raises the unemployment rate in Malaysia. Next, the Malaysian economic condition is another additional impact. This is because the employment of foreign workers has been increased. Payments are made to the foreign workers and will be sent to their country, which boosts their nation's economy. Their growing economy may then have a negative impact on Malaysian economy by reducing domestic consumption and investment (Anuar & Sukur, 2018). Besides, one of the respondents mentioned the dominance of foreign workers as additional impacts. Locals view construction workers as a poor job, which results in their minimal participation and dependence on foreign workers in the Malaysian construction industry. It is in line with the research done by Valitherm (2020). Lastly, a respondent said that poor communication between the employer and the foreign workers would result in a lot of costs associated with reworking. Due to the low participation of local skilled workers in the construction industry, unskilled foreign workers will need to take their place. They require supervision from employers to do the work (Oke, 2017). Yet a lot of foreign workers struggle to understand both Malay and English, which lead to miscommunications and improper construction work. Then, it requires rework, and the cost rises.

4.4.2 The Impacts Brought On By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

Table 4.6 shows the impacts brought on by the low participation of local skilled workers in the Malaysian construction industry. There are 4 impacts in total. A 5-point Likert scale was used for assessing each respondent's replies, with the options: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). Mean value that has the value more than 3.40 indicates the higher agreement from the respondents on the impact.

Statement	Ν	Mean	SD	Ranking
Dependency of Foreign Workers	94	4.32	.832	1
Low Quality of Works	94	4.11	.782	2
Delay in Work	94	4.10	.817	3
High Construction Costs	94	4.09	.838	4

Table 4. 6: Statistics of The Impacts Brought on By the Low Participation of Local Skilled Workers in the Malaysian Construction Industry

According to the table above, the respective mean value of each impact is presented as follows according to the ranking: Dependency of foreign workers (4.32), Low quality of works (4.11), Delay in work (4.10), and High construction costs (4.09). The respondents strongly agree with the impact, dependency of foreign workers (M=4.32). It has been ranked as the highest. The result is in line with Kumar (2016) and Valitherm (2020), who claimed that a large number of foreign workers are employed by employers due to their trait of not being picky and willingness to accept the employment chances as well as the difficulty in hiring a large number of local skilled workers who are eager to work in Malaysia's construction industry. The last statement, high construction costs, received a ranking of fourth (M=4.09). This is also consistent with a study by UKEssays (2017), in which hiring foreign workers drives up construction costs because it necessitates paying for their training, medical exams, transportation, and levies, as well as other costs associated with their employment. The pressure from this situation has increased on Malaysia's construction industry's employers that hire foreign workers. The onus of ensuring that foreign workers are in excellent health and are readily accessible to enter the construction industry rests with the employers.

4.5 Findings on The Effectiveness of the Proposed Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry

In this section, the statistics on the proposed strategies whether it is effective in addressing the low level of the local skilled workers participation in the Malaysian construction industry will be analysed and discussed. The additional strategies that some of the respondents have brought up are also further emphasised.

4.5.1 The Additional Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry

Table 4.7 shows the additional strategies in addressing the low level of local skilled workers participation in the Malaysian construction industry.

Table 4. 7: The Additional Strategies in Addressing the Low Level of Local Skilled WorkersParticipation in the Malaysian Construction Industry

Theme	Additional Strategies	Frequency	
Openness to	The opportunities should give equally to	1	
Diversity	everyone, not based on the nationality or ethnicity.		
Wage	Increase the minimum wages of nowadays.	1	

Education	The education institution should encourage	2
	the students to work locally after graduate.	
	Collaboration with the industry association	
	that has accreditation for educational	
	institutions.	
Total		4

One of the respondents had proposed openness to diversity in the construction industry as one of the additional strategies because they feel that the Malaysian construction industry should be inclusive of diversity by providing equal opportunity to all people, regardless of their nationality or race. This assertion is supported by Rahim (2022). Local skilled workers will have more chances, and there will be less reliance on foreign workers. Given that the pay for local skilled workers is generally low, another respondent suggested increasing today's minimum wage. The suggestion received support from UKEssays (2017) and Mohd Najib et al. (2019, 2020). Employers can use the minimum wage system to establish or raise the ideal wage for local skilled workers based on their level of knowledge. Through this, the local labour will agree to the fair wage rate under the wage regulation system, and they can keep up with the rising cost of living in this era. Two of the respondents have made a similar suggestion for an additional strategy which is education institution improvement. They recommend that the educational institution should encourage students to work locally after graduation. This might work in collaboration with the industry association that has accreditation for educational institutions. Mohd Najib (2019, 2020) and Mohd Fateh (2022) mentioned this as well.

4.5.2 The Effectiveness of the Proposed Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry

Table 4.8 shows the effectiveness of the proposed strategies in addressing the low participation of local skilled workers in the Malaysian construction industry. There are a total of 7 strategies. Each response was examined on a 5-point Likert scale with the following options: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). Mean value which is more than 3.40 indicates the respondents have higher agreement on the strategy, where it is effective in addressing the issue.

Statement	Ν	Mean	SD	Ranking
Improve the WorkingConditions and Safety	94	4.49	.715	1
Practices				
Incentives and Rewards System	94	4.49	.635	1
Provide A Good Welfare	94	4.26	.789	2
Awareness of Career Opportunities	94	4.26	.732	2
Minimum Wage System	94	4.17	.682	5
Promote Labour-Intensive Construction	94	4.07	.806	6
with IndustrialBuilding System (IBS)				
Government Recruitment Policies	94	4.01	.769	7

Table 4. 8: Statistics of The Effectiveness of the Proposed Strategies in Addressing the Low Level of Local Skilled Workers Participation in the Malaysian Construction Industry.

Table 4.8 demonstrates the 7 strategies, and each has received a different mean value. Following are the mean value for each strategy according to ranking: Improve the working conditions and safety practices (4.49), Incentives and rewards system (4.49), Provide a good welfare (4.26), Awareness of career opportunities (4.26), Minimum wage system (4.17), Promote Labour-Intensive construction with Industrial Building System (IBS) (4.07), and Government recruitment policies (4.01). After analysis, the researcher has identified the top and the least effective strategies in addressing the issue. The respondents indicated that the strategy of improving working conditions and safety practices (M=4.49) is very effective, attained among the other strategies. Both Mohd Najib (2019, 2020) and Mohd Fateh (2022) support this finding. Many local skilled workers have high risk awareness. Thus, employers must improve working conditions and safety practices by introducing more safety equipment in construction sites, ensuring a respectable working environment, and much more. This increases the confidence of local skilled workers in entering the building industry. Then, the respondents concurred that government recruitment policies (M=4.01) are effectively solve the issue of low participation of local skilled workers in the Malaysian construction industry. Even while it is still thought to be effective, it came last among the other strategies. The result is coherent with Mohd Najib (2019, 2020) and Mohd Fateh (2022)'s literature. Reductions in the amount of unskilled foreign workers may result from changes in recruitment policies and it can attract the local skilled workers from the adoption of consistent, coordinated, and wellaligned government policies.

5.0 Conclusion

The involvement of local skilled workers is vital for the smooth and high-quality operation of the construction industry in Malaysia. Hence, poor local skilled workers involvement in the Malaysian construction industry must receive considerable attention. This study focuses on the exploration of the key factors of low participation of local skilled workers in the Malaysian construction industry and finds consensus among respondents regarding these factors' significance. Furthermore, it also assesses the impacts of this issue on the construction industry, raising awareness among employers about its serious implications. This research also found out the effective strategies for the employers to address the low level of local skilled workers participation in the Malaysian construction industry. From the findings, most of the respondents have strongly agreed that among all the mentioned strategies, improve the working conditions and safety practices and incentives and rewards system are the most effective in addressing the issue. All of this research's findings have been summarised and interpreted using graphics, tables, and figures to determine whether the research aims and objectives were met, and whether the outcomes and literature review comparison are compatible with previous finding. In summary, this study will advance knowledge of factors and impacts as well as explore the workable solutions to the local skilled workers' low participation in Malaysia's construction industry. Employers can leverage these insights to proactively enhance local skilled worker involvement, ensuring the sector's sustainability and growth.

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Abstract

Big data, originating in the 1990s, is a vast and complex dataset that surpasses the capacity of traditional data management tools. The International Business Corporation Machines claimed that daily data creation reaches 2.5 quintillion bytes, indicating the complexity nature of big data. Apart from its sheer volume, the complexity also arises from its attributes such as velocity, and veracity as reflected in the 7Vs framework. Transitioning to the real estate sector, big data has a major influence on Malaysia's real estate market. Big data adoption enhances the transparency and reliability of the market, benefiting both buyers and sellers. Given its position as a significant driver of economic growth, the real estate market is influenced by diverse factors namely economic conditions, market trends and others. As the market is dynamic and constantly changing, it is imperative that big data is employed in the industry. The central focus of this research is on the vital role of valuers in leveraging big data in the real estate industry in Malaysia to gain accurate and precise valuation. This research addresses three key questions, exploring factors encouraging big data adoption among valuers, the impacts of the adoption and the challenges faced in daily operations. The study uses a quantitative approach, relying on primary data from surveys, to assess real-world scenarios and experiences of valuation practice and big data utilization. In conclusion, this research provides a detailed exploration on the relevance of big data in the real estate sector and serves as a foundation for future studies to harness the full potential of big data in real estate practice.

Keywords: Big Data, Real Estate Market, Valuers, Adoption, Challenges
1.0 Introduction

In today's data driven era, big data emerges as a pivotal concept. Since the 1990s, the term 'big data' has been generally referred to extremely large and massive datasets that are challenging to manage, process and analyze using conventional data processing methods. The problem lies not only in handling ever-increasing amounts of data, but also in handling data that is becoming more complex and interconnected and in a wider range of formats Riahi & Youssra (2018). As we navigate the dynamic landscape of big data, it has revolutionized entire industries and making its mark on our daily lives, shaping the foundations of how the industries operate and individuals engage in the modern world. With that being said, big data has undeniably evolved into an integral component of the cultural and behavioral landscape of humanity. Big data is considered characteristically complex and it is a phenomenon that needs to be fully explored as a great deal of emphasis has been placed on the anticipated benefits of mining data that will generate new understanding of human behaviour, lifestyle and habits Winson-Geideman & Krause (2016).

It is essential to emphasize that the term 'big data' extends beyond the sheer volume of data. Instead, it refers to a broad concept that consists of several characteristics (7V) known as Volume, Velocity, Variety, Variability, Veracity, Value and Visualization. Each of those characteristics has its own role and impact in the domain of contemporary data analytics. In addition, the most commonly used classification of big data includes three main types which are structured, semi-structured and unstructured.

Shifting to the real estate sector, it refers to the industry involved in the development, buying, selling, leasing, and management of real estate properties. Malaysia's real estate market is diverse and plays a crucial role in the overall economy, serving as a significant driver of economic growth, investment, and wealth creation. In addition, this sector is influenced by factors such as economic conditions, demographics, interest rates, and market trends.

According to De Mauro (2016), utilization and management of big data are impacting many fields of activities of our society and applications of big data have shown a consistent level of adaptability to the different requirements arising from disparate scientific domains and industrial organizations. Big data has a significant impact on numerous industries, including real estate and it is pertinent to understand and adapt to changing market dynamics, mitigate risks, and provide efficient services to the respective clients. Furthermore, big data plays a pivotal role in enhancing the accuracy and efficiency of the valuation process while real estate valuers utilize vast amounts of datasets to compare recent property sales, assess neighbourhood characteristics, and take into account economic factors, resulting in more

precise and timely property valuations. This data-driven approach not only benefits buyers and sellers, but also contributes to a more transparent and reliable real estate market.

2.0 Problem Statement

Real estate remains to be the biggest asset class in the world and can be considered as a developing sector in emerging economies or regions experiencing rapid urbanization and economic growth. As the industry expands, there are some advancements in the real estate sector involving the integrations of data driven technologies to enhance property valuation processes. Real estate valuers can harness the power of big data to analyze massive datasets, identify market trends and predict future property values. On top of that, this datadriven approach allows for more accurate market assessments and their adaptation to Big Data tools is crucial for enhancing accuracy, efficiency, and overall decision-making in the valuation process. However, there are some potential problems are identified as follows:

- Big data offers numerous benefits to the industry, from uncovering valuable insights on the real estate market, improved efficiency and enhanced decision-making. However, a recent report made by World Bank Group indicated that Malaysia still lags behind neighbouring countries in the adoption of users-friendly and data-driven digital solutions Sanghi (2023). Therefore, there exists a notable lack of awareness regarding the potential of utilizing big data in real estate industry.
- 2. Although big data has the potential to revolutionise the real estate industry, there will be a few challenges in dealing with the massive number of datasets that require scalable and powerful tools. According to Miwfm (2023) it is stated that this industry has yet to fully embrace the potential of big data due to the traditional mindset and industry fragmentation, lack of data integration and interoperability, data security and privacy concerns, and limited awareness and expertise.
- 3. Real estate industry has always been a data-driven sector due to the massive amounts of datasets that are processed every day and big data should be implemented in order to minimize the workload on professionals. A study by Xiao (2022) claims that the potential of big data in real estate is in gradual progress since it characteristically remains a complex subject.

Given that there is a lack of research and a critical gap in understanding in leveraging big data among real estate valuers in Malaysia real estate industry, this research is undertaken.

This research will be more specific and focused on Klang Valley only.

3.0 Research Questions

The following questions have directed this research to accomplish the objectives:

- i. What are the factors that encourage the adoption of big data among real estate valuers?
- ii. What are the impacts of adopting big data among real estate valuers?
- iii. What are the challenges faced by real estate valuers in adopting big data in their daily operations?

4.0 Research Objectives

The main aim of this research is to identify the factors and challenges faced by real estate valuers in leveraging big data in real estate valuation practice. To achieve this aim, the following objectives have been identified as follows:

- i. To identify the factors that encourage the adoption of big data by real estate valuers.
- ii. To study the impacts of adopting big data among real estate valuers.
- iii. To explore the challenges faced by real estate valuers in adopting big data in their daily operations.

5.0 Literature Review

5.1 Big Data Definition

In this era of modernization, big data stands as a transformative catalyst affecting every aspects of our lives. This is the realms of big data a concept that goes beyond just numbers and bytes. Factually, big data is defined as too large and diverse datasets which are beyond the ability of conventional database software tools to capture, store, manage and analyze. Madden (2012) neatly summarises Big Data as data that is too big as organisations are now collecting petabytes of data, too fast as processing applications must provide nearly instantaneous results, and too hard when new technologies are required to analyse it.

5.2 Real Estate

In general, land, buildings and other improvements on the land are all natural resources associated with the land such as minerals, water and vegetation. Chen (2023) defined that real estate refers to the land and any permanent structures, like a home, or improvements attached to the land, whether natural or man-made. In the broader context, real estate refers to the industry involved in the development, buying, selling, leasing and management of real estate properties.

Malaysia's real estate market has always been diversified as well as crucial to the overall economy. It serves as a significant driver of economic growth, investment and wealth creation.

On top of that, the dynamics of real estate sector are heavily influenced by economic conditions, demographics, interest rates and prevailing market trends. Demographic trends

such as population growth and age distribution significantly impact the real estate market. Understanding demographic shifts is essential for anticipating market demands.

5.3 Big data and Real Estate

Big data has become a cornerstone of innovation within the real estate industry. Leveraging big data in the industry has resulted in transformative changes, offering valuable insights, enhancing decision-making processes and increasing overall efficiency. Real estate professionals can harness the power of vast datasets encompassing market trends, property values and economic indicators in order to make more accurate predictions. This enables them to make well-informed decisions concerning property investments, development projects and pricing strategies.

Moreover, big data has a significant impact on the landscape of property valuation. Utilization of big data allows for more precise property valuations by taking into account a wide range of variables such as comparable sales, surroundings, market trends and property conditions. This data-driven approach significantly reduces the risks of overvaluation and undervaluation, resulting in a more reliable basis for property appraisals.

5.4 Valuers

In the context of real estate industry, valuers are professionals who specialize in determining the market value of properties. Aliasak (2016) states that valuation surveyors provide services in terms of property values and professional advice on the real estate valuation of land, buildings, plants and machineries, as well as the valuation of businesses in Malaysia. Valuers who are frequently certified and qualified, are responsible for assessing the various factors that contribute to a property's overall value. The contributing factors would include the property's location, condition, size and recent comparable sales in the market.

Valuers may employ different methodologies in order to derive the market value of the property. On top of that, valuers provide unbiased assessments of property values in their capacity as impartial and objective experts. In addition to the quantitative side of property valuation, valuers possess a comprehensive understanding of market dynamics, legal regulations and economic conditions. Their diverse knowledge and skills are crucial for maintaining the integrity and reliability of the real estate sector.

5.5 Factors

5.5.1 Enhanced accuracy and precision

Real estate valuers are adopting big data in order to improve accuracy and precision in property valuation. Big data enables valuers to process and analyze massive datasets with a level of detail that was previously unattainable. With the utilization of big data, valuers can take into accounts a wide range of variables such as property features, market trends and comparable sales data in order to produce more accurate assessment of the diverse real estate market. According to Xiao (2022), valuations can be done more accurately based on the data that has been acquired or shared by different players. This precision analysis is crucial for both valuers and clients as it will lead to decision-making in the dynamic real estate market.

5.5.2 Improved market insights

Big data offers real estate valuers an enormous amount of information that goes beyond what traditional sources can provide. The adoption of big data offers real estate valuers access to

a diverse array of datasets, including social, economic, and demographic information. By analyzing diverse datasets, valuers can gain a deeper level of understanding trends, regional dynamics, user preferences and so on. For example, this detailed analysis allows valuers to identify overarching market trends, such as fluctuations in property values, shifts in demand for specific property types, and evolving preferences among buyers. Real estate valuers are better equipped to provide informed advice to clients, effectively navigate market fluctuations and contribute to strategic decision-making by combining these diverse insights.

5.5.3 Competitive advantage

In a highly competitive real estate market, valuers who embrace big data gain a significant competitive advantage. Kok (2017) claims that there is huge and fierce competition among the technologies to handle the market. The adoption of big data streamlines and accelerates the valuation processes and also empowers valuers to adapt swiftly to changing market dynamics. By applying this data driven approach, this not only sets valuers apart from competitors but also has the ability to provide the clients with insights into emerging opportunities and potential risks. Wei (2022) adds that having access to this kind of data supports business decision-making processes. In addition, valuers harnessing the potential of big data not only attract clients seeking advanced methods but also establish a foundation for client retention. The consistent delivery of high-quality, innovative, and adaptable services becomes a hallmark of their approach, creating a symbiotic relationship where clients not only seek their expertise initially but continue to rely on their services over time.

5.5.4 Risk mitigation

Big data plays a pivotal role in risk mitigation for real estate valuers. By analyzing historical data and employing predictive analysis, valuers may assess the potential risks and uncertainties associated with potential developments of specific properties. This approach also allows valuers to anticipate challenges such as economic downturns, property values' fluctuations and changes in zoning regulations. For example, valuers may apply market comparison approach in order to derive the market value of a property and a study conducted by Grybauskas (2021) highlights that the risk of selecting the wrong property is also minimized by reliance on big data. As a result, this insight enables them to guide clients on strategies to navigate downturns effectively, potentially minimizing the impact on property values and investment portfolios.

5.6 Impacts

5.6.1 Optimized valuation workflow

Efficient workflow optimization is a major driving force behind real estate valuers' adoption of big data. This factor includes several advantages that contribute to efficiency, accuracy and adaptability in the property valuation process. Automated data analysis is a key feature of an optimized workflow. By leveraging big data in the valuation process, valuers are able to eliminate manual and time- consuming processes, which speeds up the identification of patterns, trends and correlations within the data.

Thorough the integration of big data in the industry, real estate valuers acquire the capability to access and utilize real-time market information. This ensures that their analyses and decision-making processes are based on the most current and relevant data, allowing for quick adjustments to changing circumstances during the valuation process. Wei (2022) also indicates that the real-time details ought to be represented in an authentic and profound way for better understanding and engagement of clients. By adopting big data for workflow optimization, valuers can differentiate themselves by offering faster, more accurate, and efficient services, attracting clients who prioritize these qualities.

5.6.2 Insightful projections of real estate development opportunities

Adopting big data among real estate valuers has a significant impact on fostering insightful projections of real estate development opportunities. With the intention of delivering expert viewpoints, valuers must analyze and extract information from diverse datasets such as market trends, demographic information and economic indicators. This comprehensive analysis with the utilization of big data goes beyond historical data, allowing valuers to discern pattern, identify emerging opportunities and make informed projections regarding the potential developments.

On top of that, valuers can delve into micro-level details such as consumer behaviour and urbanization trends to gain a comprehensive view of the opportunities and challenges associated with specific regions or property types. Cheryshenko and Pomernyuk (2021) also adds the significant expansion in data access and the probability of collecting each kind of information measurable gives room for development and novel revenue models in the real estate market.

5.6.3 Client-centric services

Client-centric services are approaches in which a business or service provider focuses on meeting the specific needs, preferences and expectations of individual clients. Through big data, valuers can adapt their methodologies to align with each client's investment portfolio and objectives. Clients are likely to prefer valuers who can provide more reliable and precise valuations, positioning these professionals as leaders in the industry. Additionally, big data facilitates more effective communication between valuers and clients, leading to leading to transparent communication that builds trust and enhances the overall client experience, reinforcing the client-centric nature of the services provided. Xiao (2022) indicates big data makes it possible to manage assets in a rational and individualized manner, thus improving investors and clients' fulfilment.

5.6.4 Aid better decision-making

Leveraging big data in real estate industry significantly aids in better decision-making as it provides nuanced understanding of market dynamics by incorporating diverse data sources and factors influencing real estate market. In addition to its capacity for historical data analysis, big data also facilitates real-time access to market information. This enables the valuers anticipating shifts in property values, market demand and other factors, resulting in more robust and insightful decision-making. A study by Li (2021) states that the massive data from the real estate industry can effectively produce the prediction of growth of consumer demands and productivity, and data can provide the basis and sources for business decision-making and strategy formulation. This approach also align well with the diverse needs and goals of clients, making the decision- making process more inclusive and informed.

5.7 Challenges

5.7.1 Data quality and standardization

Big data relies heavily on the quality and standardization of data. Valuers may encounter challenges in obtaining accurate and standardized data since the data comes in various formats and from various sources. Datasets from various sources may have inconsistencies, inaccuracies, or lack uniform standards, making it difficult to maintain reliable and accurate information. Rossini (2011) indicates that if huge datasets are aggregated over time, it is mostly challenging to assess the quality of this data. As a result, inaccurate or inconsistent data can jeopardise the reliability of valuations, limiting the effectiveness of big data adoption

in daily operations. Other than that, poor data quality can lead to flawed analyses, misleading conclusion and inaccurate valuation.

5.7.2 Data security and privacy concerns

Real estate valuers normally deal with sensitive information related to property details, financial transactions and clients' personal informations. It is known that real estate data comes in various formats and often rely on third-party data providers, including public records, government databases and proprietary datasets. Managing the variety and complexity of these data types can be challenging. Due to its sheer volume of data, real estate valuers must carefully assess and validate the credibility of external data providers to ensure the accuracy of the information they incorporate into their analyses. However, a research conducted by Ali & Siniak (2020) highlights that the contradictions between privacy protections and big data remain irreconcilable.

5.7.3 Lack of talent pool

Real estate valuers may lack the necessary skills and training to effectively leverage big data tools and technologies. Kumar & Jothimani (2017) stated that there is a need for talent with the increase in amount of data being generated. The adoption of big data requires specialized skills in data analytics, machine learning, and data management and valuers may struggle to harness the full potential of big data without adequate skills. On the other hand, real estate has traditionally been a field driven by expertise in property valuation, market trends and legal considerations. The incorporation of big data signals a shift towards a more data-centric approach. However, due to lack of exposure, professionals may be unaware of the potential applications and benefits of big data in their field.

6.0 Research Methodology

6.1 Research Approach

There will be only one approach used for this research, known as quantitative approach. This approach entails analyzing and collecting numerical data in order to identify trends, calculate averages, assess relationships, and derive broad insights. The decision to exclusively use a quantitative approach is based on the need for numerical precision and statistical generalizability in addressing the specific objectives of the research.

6.2 Research Methods

In the pursuit of understanding the awareness and challenges among valuers regarding the utilization of Big Data in real estate valuation practise, this research adopts a non-experimental research approach. By choosing non-experimental research methods, the study focuses on the analysis and interpretation of existing data to uncover the nuances surrounding the awareness and challenges faced by valuers in adopting big data practices within the real estate industry. This method allows for a thorough examination of real-world scenarios and experiences, shedding light on the practical aspects of incorporating big data in the field of property valuation.

6.3 Data Collection Method and Instrument

This study will rely on primary data which refers to the original data derived from our research endeavours. An online survey will be conducted in order to ease the way for the targeted respondents to complete it. An online survey refers to a set of questions created as Web forms, with analytics provided by statistical software and the answers stored in a database. By directly gathering information from the survey, this research seeks to provide an authentic and

firsthand understanding of the subject matter. An online survey will be conducted in order to ease the way for the targeted respondents to complete it.

6.4 Research Phases

This research has three phases, which are as follows:

6.4.1 Literature Reviews

In the first phase of the research methodology, a comprehensive literature review will be conducted to explore and synthesize existing knowledge related to the specified topic. Literature review involve gathering secondary resources from newspapers, reports, journals, articles and books. The gathered information will provide depth understanding the definition, characteristics and the common sources of Big Data is generated. On top of that, the literature reviews will be reviewed to identify the factors that encourage the adoption of Big Data among valuers and the challenges faced by them by the adoption.

6.4.2 Questionnaire Survey

In order to achieve the research objectives, a questionnaire will be designed as the data collection instrument which will explore the utilization of big data in the real estate sector with a specific emphasis on identifying the factors, impacts and also the challenges faced by real estate valuers. The questionnaire will be distributed to valuation firms operating in Klang Valley and the data will be obtained from valuers who are practising in Klang Valley and selected by means of judgmental sampling or also known as 'purposive sampling'.

6.4.3 Data Analysis

In this study, the research methodology exclusively relies on primary data which refers to the original data derived from our research endeavours. With that being said, the data collected for my study is directly obtained from the targeted respondents of real estate valuers who are practising within Klang Valley via structured questionnaires that will be distributed. The decision to concentrate solely on primary data collection ensures that the information gathered is tailored to the specific objectives of this research. The collected data will then be analyzed using the Statistical Package for the Social Sciences (SPSS) software, which will be focusing on descriptive statistics only. The main aim of the data analysis is used to determine the level of awareness on Big Data among real estate valuers, identifying the factors that encourage the adoption of Big Data by real estate valuers and to explore the challenges faced by real estate valuers in adopting Big Data in their daily operations.

7.0 Significance of Study

The significance of this research has been identified as follows:

- i. 1.This research has the potential to increase awareness among real estate valuers regarding the benefits of leveraging big data into the practises in order to enhance the accuracy of valuation processes.
- ii. 2.The study can provide insight into how valuers' decision- making processes are impacted by big data awareness and challenges. Financial institutions, real estate agents, and investors can all benefit from having this knowledge in order to make well-informed decisions based on more accurate and current information.
- iii. This research is important in order to lead to improvements in valuation processes by providing a more accurate and reliable property assessments.

- iv. This research provides a foundation that may pave the way for the development of new technologies, tools and methodologies that address the specific needs of real estate valuers.
- v. The study can aid in the creation of strategies and solutions by highlighting the difficulties real estate valuers encounter when implementing Big Data. The efficiency and efficacy of real estate valuation procedures could be improved by overcoming these obstacles.

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