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Objective
The Journal of Valuation and Property Services is a publication specifically intended for property professionals to keep abreast with the developments in the property industry as well as the real estate profession.

This journal serves as a platform for the exchange of information and ideas on property issues. It seeks to:

i. address areas of major interest and practical relevance to the real estate profesion.
ii. create awareness of new theories, techniques and applications as well as related concepts relevant to the real estate profesion.
iii. discuss policy issues and regulations and their implications on the property market.

We therefore welcome articles with theoretical and practical relevance to the real estate industry and profesion, property valuation, property management, property investment and market analysis.

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REFEREE PANEL

ABILITY TO SECURE HOME FINANCING AMONG FIRST-TIME HOUSE BUYERS IN THE KLANG VALLEY, MALAYSIA: PERSPECTIVES FROM INDUSTRY PLAYERS

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ABSTRACT
Home financing facilities provide significant financial support in pursuing the homeownership dream. However, securing home financing can be a challenge to households who are restricted by financing constraints comprising high gearing ratio, poor credit track record and small residual income to serve monthly instalment of home financing. Therefore, this study examines the factors that influence the ability to secure home financing among potential first-time house buyers in the Klang Valley, Malaysia. By adopting the qualitative approach, this study examines the factors that influence the ability to secure home financing from the perspective of industry players such as financial institutions, affordable housing agencies and other related government agency. The results show that credit quality and income constraints are significant factors in influencing the ability to secure home financing among potential first-time house buyers. Thus, the key implication suggests that potential first-time house buyers should possess good credit track record and maintain a stable pecuniary resource prior to the application of home financing facility. Moreover, these resources will reveal the financial capacity to take on long-term financing obligation such as home financing until full settlement or the end of financing tenure.

Keyword: *Borrowing constraint, first-time house buyers, home financing, homeownership*

1. INTRODUCTION

House is a major asset and often form as one of the largest and longest investment in a person's life. A large sum of money is required to purchase a house and it is unlikely to be purchased outright. Therefore, securing home financing would be the option to partially finance the purchase of a house. Nevertheless, having the option to secure a home financing may be challenging to some as typically households may be restricted by liquidity constraint to enter the housing and home financing market and hinder the realisation of homeownership. According to the World Bank (2019), about 93% of adults do not have access to formal housing finance and hence they are not able to live in a decent home.

In Malaysia, many house buyers depend on home financing solutions to finance the cost of home purchases. However, a report by the Central Bank of Malaysia (BNM) highlighted that home financing applications are often rejected due to highly indebted applicants that have little residual income to meet the scheduled financing repayment without considering the possible increase in the interest rates in the future (Bank Negara Malaysia, 2018). The pressure to overcome the home financing rejection has led the government agencies to introduce a few initiatives such as a fund for affordable home by the BNM to help the potential first time house buyers (Cagamas, 2011). Despite the initiatives, there is constant disagreement between the stakeholders on the issue of high rejection rate of home financing that continue to hamper house buyers, particularly to those who want to become a homeowner for the first time (Yong, 2017).

In response to this, this study intends to examine the factors that influence the ability to secure home financing among potential first-time house buyers in Klang Valley. The outcome of this study will reveal the factors that related to borrowing constraints (i.e. income, wealth and credit quality constraints) and expenditure patterns influencing home financing ability among the said population.

2. LITERATURE REVIEW

2.1 Ability to secure home financing

The connotation of the word "ability" that links the housing and home financing affordability provides the risk indicator to the home financier towards the grant of approval of home financing facility to an eligible applicant. It is opined that homeownership is achievable when potential house buyers are able to show that they have sufficient fund to pay for the down payment, can afford the monthly repayment without jeopardising their ability to pay for other non-housing consumption and also, possesses a healthy credit background (Barakova et al., 2014; Bourassa, 1995; Gan & Hill, 2009; Linneman & Wachter, 1989; Quercia et al., 2003). Additionally, the measurement of financial ability should include the ability to cover daily household expenses so as not to end up borrowing to meet the basic needs (AKPK, 2018). One needs to ensure that their cashflow is sustainable and able to stay resilient after taking on a large and long tenure financing commitment such as home financing.

2.2 Borrowing constraints

Having identified the main factors under the borrowing constraints, a further discussion is made pertaining to them under the following subsections.

2.2.1 Income constraints

Income, a primary financial resource to a household, is an important determinant that potentially affects families' purchasing power and consumer demand. A stable

and consistent income flow is much needed in order for an individual manages their expenses including home financing obligations. As such, household income influences homeownership and home financing decision (Zulkifli & Ismail, 2023).

Generally, income refers to a human capital endowment, be it in the form of a regular salary received in a fixed interval typically monthly or wages received on a daily or weekly basis, plus the income of the individual's spouse; if there is one as well as other households (Bourassa & Shi, 2017). Other than regular salary and wages from part-time job or services, a regular financial transfer is another financial resource that can support liquidity constrained households (Lee et al., 2018; Spilerman & Wolff, 2012).

In the context of this study, income is the main component in the credit underwriting parameter since it is the initial step towards the repayment of the financing amount. Taking out large financing facility such as home financing is risky for the low-income earners as compared to the higher income households who foreseen to have better cash flows (Nguyen, 2019). Meanwhile measuring the level of income is crucial to the financiers in order to reduce the exposure to risky borrowers such as one with low household income. As such, income plays an important role in promoting homeownership and determines the likelihood for the grant of home financing facility (Carter, 2011). Hence, potential first-time house buyers should have an established income flow in order to have a better opportunity to secure home financing.

2.2.2 Wealth constraints

Wealth is defined as the value of things or assets that people owned at a single point of time (Parkin, 2009). It includes accumulated savings, inheritance, proceeds from selling off assets, investments and accumulated financed or non-financed assets. In the context of homeownership, the wealth must be liquid and ready to be used to invest in a house. Therefore, the definition of wealth used in this study comprise accumulated cash sourced from own savings (Carter, 2011), financial transfer from parents (Lee et al., 2018) and bequest (Tiwari et al., 2007), annual dividend received from unit trust investment (Bourassa & Shi, 2017) and provident fund that was created through a mandatory contribution from the employers and employees (Tang & Coulson, 2017). Although the main function of the provident fund as retirement saving plan, regulators in certain countries have allowed the provident fund to be partially withdrawn for other purposes such as housing. In Malaysian context, the provident fund which is known as Employees Provident Fund (EPF) has allowed an individual contributor to partially withdraw from their retirement savings to finance the purchase of a house (Doling & Omar, 2012). These initiatives provide alternative to the potential house buyers and closing cost assistance to new home buyers.

Since decades, research has shown that down payment requirement has deterred the homeownership especially among first-time house buyers and the requirement has likely led to liquidity constrained (Bourassa, 1995).

This barrier has been the reason for first-time house buyers delaying in upgrading their tenure from renting to owning. Low of income has reduced household's ability to save for down payment and later reduced their ability to oblige with monthly home financing repayment (Badrudin et al., 2022; Bourassa, 1995; Nwuba & Chukwuma-Nwuba, 2018).

According to Bourassa (1996), sufficient accumulated wealth is needed in housing to pay the down payment while any remaining wealth and income will still be enough to pay the home financing instalments and other remaining housing costs. Stacy et al. (2018) have mentioned that the ability to pay down payment is one of the items under the underwriting measure that indicate the preparedness of the prospective borrowers for homeownership and how far the down payment provides a cushion against default. This suggests that cash-out for a down payment reveals one's readiness to carry a long-term commitment and responsibilities as a homeowner.

2.2.3 Credit quality constraint

Getting access to credit assists household to finance their current consumption, purchase durable goods, housing, or any types of assets. Typically, households are assumed that they could repay the debt through the expectation of their higher future income. However, this notion seems feasible in a world with the perfect capital market that would enable the household gets the financing as desired (Chen & Chivakul, 2008). Realistically, households who are interested to borrow or borrowing more to finance their consumption, may not be able to do so due to credit constraint.

Credit constraint can be defined as a condition in which households who have a history of credit denials, received only a partial amount of debt from the full amount requested (Rosenthal, 2002), have a high level of credit utilisation (Calem et al., 2010), lack or have no credit track record (Calem et al., 2010), or have a poor status of credit history (Barakova et al., 2014; Ebekozien et al., 2019). All these characteristics may affect the level of creditworthiness, hence reducing the credit quality of the households.

In addition, it is impossible to predict who will default on their repayment obligations. Thus, it is a duty of a lender to conduct customer's due diligence to examine borrower's ability to meet the existing and upcoming financing obligations. The assessment will inform the lender about the household's creditworthiness and the amount of credit risk that they will face if the credit facility such as home financing is extended in the future. In sum, a careful and sensible credit examination is crucial to reduce the degree of loss.

2.3 Expenditure patterns

Household expenditures are the amount of money spent by resident households to meet their necessities such as food, clothing, housing, energy, transport, durable goods (notably cars), healthcare, leisure, and miscellaneous services (OECD, 2020). In Malaysian landscape, household consumption expenditure is defined as the expenditure for private consumption on goods and services during the reference period. The expenditure refers to the value of consumers goods and services acquired whether they are used or paid by a household through cash, credit, own-account production, or barter as income; for the purpose of fulfilling the residents' satisfaction of needs and wants (Department of Statistics Malaysia, 2019). From an economics viewpoint, an individual sets a budget allocation based on their income for maximisation of utility on household goods and services. Typically, households spend their income on the basic needs that correspond to the standard of living. As such, it is common to note that income has been used to measure the level of affordability.

Nevertheless, Alaudin et al. (2016) suggested that a household's well-being is better measured by expenditure rather than income. This is because expenditure and behaviour of

spending are important indicators for a financial standing that reflect the level of affordability of a household in a country. In addition, there are conditions that a large portion of income may be utilised to cope with a household's daily expenses, especially among lower income earners. Higher expenditure derived from high debt commitment and high household expenses can lead to liquidity constraints that will affect the households' ability to further take additional financing commitments. In agreement with Sohaimi et al. (2018), measuring housing and home financing eligibility should not only consider the household income but also the expenditure pattern since it can affect the financial standing of the household.

3. RESEARCH METHODOLOGY

In this study, a qualitative approach is employed. Purposive sampling technique was adopted in view to reach out the knowledgeable participants of the interviews in capturing their opinions regarding the ability to secure home financing among first-time house buyers. As such, 12 participants were involved and they were from the financial institutions, affordable housing agencies, and other related government agencies who have the experience in handling affordable housing and home financing related matters. The participants were individuals who hold managerial position, whose role in the organisation was significant enough in overseeing various activities involving home financing matters first-hand (Table 1). Depending on the respective organisation they represented, their roles include empowering home financing information and knowledge to potential first-time house buyers, enabling the home financing applications, making a recommendation based on the merit and demerit of each case and deciding on the home financing applications. The interviews were conducted through face-to-face, phone calls and video calls. The set of interview questions were aimed to explore and understand the influence of borrowing constraints and expenditure pattern in securing home financing from the perspective of industry players. The key patterns from the interviews were established and any redundant comments were merged before drawing the conclusions of the key findings.

Table 1: Details of Interviewees

Interviewee	Current position in organisation	Organisation
HA1	Principal Assistant Director	Government housing agency
HA2	Senior Assistant Director	Government housing agency
HA3	Sales and Marketing Director	Government housing agency
HA4	Sales Manager	Government housing agency
HA5	Head, Sales	Government housing agency
HA6	Head, End Finance	Government housing agency
B1	Retail Credit Manager	Commercial bank
B2	Assistant Branch Manager, Sales & Marketing	Commercial bank
B3	Retail Credit Manager	Commercial bank
B4	Assistant Branch Manager, Sales & Marketing	Commercial bank
B5	Head, Strategic Alliance Mortgage Business	Commercial bank
GA1	Manager, financial education	Government agency

4. ANALYSIS AND DISCUSSION

The interviews with respective personnel from the real estate industry have unpacked the factors that influence the ability to secure home financing.

4.1 Income Constraint

Income was found to be significantly influence the ability to secure home financing as it is the first way out to pay the home financing instalments. The participants (B1 and HA1) opined that income level should not only sufficient but also consistent and stable for the whole financing tenure.

"*…the bank needs to know whether the borrower has the capacity to sustain the repayment for 30 years. They do not want to give the loan today but, the loan account turns to default after 6 to 7 months."* (HA6)

The stability of household income determines the survival of households in maintaining current standard of living. As such, the result further revealed that consistency and sustainable income will be the key to justify the eligibility. The financial buffer should be enough so that they can continue living comfortably without stretching their cash flow. The result was seen in line with the previous study (Mohd Aini et al., 2016). Nevertheless, the interviews discovered that there is an alternative way to improve the level of income which through a joint household income, receiving income from part-time job, and/or income from small business activities. All participants were collectively agreed on the alternative as this way increases the chances to secure home financing. While other literature found that regular financial transfer from parents or family members can be used to overcome liquidity constraint and increase the eligibility to secure home financing (Cox, 1990; Engelhardt & Mayer, 1998; Lee et al., 2018; Spilerman & Wolff, 2012).

4.2 Credit Quality Constraint

Household credit background is critical in credit evaluation as it tells the financiers on the reputation of the household in handling debt obligation. Besides that, this factor helps the financiers to learn the potential risk exposure of the financing contract. The assessment of credit profile reveals the applicant's character in handling its past and current financing obligations and at the same time enable the financier to gauge their character as a paymaster to the upcoming debt such as home financing (Purohit et al., 2012). One of the participants responded that,

"Bank will evaluate the character, i.e., the stability of the borrower, how long have you been with the current job, and loan repayment history, whether the borrower is a good paymaster or bad paymaster. This credit background would determine whether the loan can be approved or not." (B4)

The results of the present study show that building a good credit track record is important to improve the eligibility to secure new financing facilities. Furthermore, this study learned that being debt-free and highly indebted were also among the top reasons that can cause home financing applications get rejected. The results were consistent with the report by the Central Bank of Malaysia (BNM) (Bank Negara Malaysia, 2020) and other literatures (Barakova et al., 2003; Barakova et al., 2014; Calem et al., 2010; Kim et al., 2020; Rosenthal, 2002). In

sum, being a credit worthy is vital as it depicts the level of responsibilities of the borrowers in handling their debt obligations.

4.3 Wealth Constraint

The findings revealed that down payment is the first hurdle in realising home ownership. The amount of down payment somewhat determined by the margin of finance (MOF) approved by the financier. The lower the MOF the higher the down payment that needs to be paid. Moreover, down payment is required as it helps to gauge the borrower's preparedness and commitment in taking risks in the home financing contract. In line with this, B2 and B4 were jointly agreed that a large contribution by the borrowers increases the chances for the home financing application to be approved. On the other note, the combination of down payment with the home equity as an excellent collateral, will likely leads the home financing borrowers to enjoy a lower financing cost and leniency in other credit terms (Stacy et al., 2018).

4.4 Expenditure Pattern

Expenditure pattern appeared to be a factor that indirectly influence the ability to secure home financing. The insignificant result can be due to the underwriting criteria which has not include the measurement of expenditure pattern. Financiers are more interested to gauge whether the borrower can serve the repayment obligations in timely manner for the whole financing tenure. Nevertheless, the analysis discovered that the total household expenditures likely affect the disposable income and determine the financial capacity to take on debt obligation. As participant HA3 responded,

"*High cost of living especially among people in the urban area did impact the ability to borrow. That is what I meant on household debt for consumption. When the financial commitment is getting higher, disposable income is insufficient to add on new loan.*" (HA3)

The participants (B4 and GA) added that overspending, over-indebted and less saving are the things that influence the repayment ability among the potential first-time house buyers. Moreover, it is proven that overspending reduces one capacity to save money and affects their financial standing. Thus, delays homeownership among young households (Ab Majid et al., 2014; Badrudin et al., 2022). So, it is the households' call to manage their income and spending in order to allow them to serve the debt obligation without jeopardising other expenditures (Abd. Rashid et al., 2018; Yunchao et al., 2020). Potential borrowers are encouraged to spend within their means and cultivate good saving habits to have a positive and stable cash flow that will help to improve their ability in securing a home financing.

5. CONCLUSION

This study examined the factors that influence the ability to secure home financing among potential first-time house buyers in Klang Valley. Preparedness is the key to home financing and homeownership dream. The stability and consistency of income flow will assist the household to meet all the financial commitments regularly and timely without jeopardising household ability to meet daily consumption.

Further exploration on home financing product innovation is suggested to be carried out in the future to assist potential house buyers in overcoming the financing constraint. An example of innovative home financing products that can be investigated is contractual saving for housing whereby the

accumulated saving can be converted to home financing facility in the future. Another instance is a financing product with a specific feature to facilitate the income earners who received irregular income from gig economy activities. This will help them to overcome the issues relating to insufficient fund and lack of financial background to enter the housing and housing finance markets. Eventually, assists the households to stay afloat and survive financially so that they are able to make up a room for adjustment in coping with the home financing repayment obligations without jeopardising the ends meet.

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Appendix A

Interview Questions

Research background

In order to further investigate the issue in concern, interviews are arranged to gain more insight about the borrowing constraints that influenced the ability to borrow a home financing among potential first-time house buyers Malaysia. The targeted respondents for the interviews are professional experts that have experienced in handling home financing application and related matter. Since the ability to purchase the house is depending on the ability to obtain a home financing, opinion from these group of experienced personnel are sought.

1. In your opinion, what are the common issue(s) that delay homeownership among potential first-time house buyers?

2. In your opinion, what could be the factors that influenced the ability to secure home financing facility?

3. What do you think of the current level of income and the ability to cope with monthly financial obligation?

4. What do you think on the current level of household expenses nowadays?

5. What is your view on deposit requirement? How does it play a role in terms of home financing affordability?

6. What do you think of applicant's credit background in securing home financing? How does credit track record play a role in one's ability to secure home financing?

7. In your opinion, which one should be emphasised by potential house buyers, sufficient income, enough fund for down payment and other entry costs or good credit background? (The most important category)

8. From your professional perspective, what is your recommendation to assist potential first-time house buyers to secure home financing?

WILLINGNESS TO PAY FOR GREEN RESIDENTIAL PROPERTY FEATURES IN ISKANDAR MALAYSIA

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ABSTRACT

The surge in interest in environmentally friendly residential properties underscores the critical role of market demands in shaping the availability of green building developments. While previous research primarily focused on the general willingness to pay for green building attributes, limited attention has been given to understanding users' valuation of specific green features. This study addresses this gap by examining user willingness to pay for various green building features in residential properties. Through an electronic questionnaire that yielded 394 valid responses for frequency analysis, the study revealed that users exhibited a greater willingness to invest in green features related to "Indoor Environment Quality (IEQ)" and "Innovation and Others (IO)" criteria, while their willingness to allocate funds to green features associated with "Energy Efficiency (EE)" and "Water Efficiency (WE)" criteria was comparatively lower. These findings provide invaluable insights for both local and foreign developers seeking to integrate green features into their residential developments in Malaysia, thereby enhancing their marketability.

Keyword: *Willingness to pay, green features, residential property, preference study.*

1. INTRODUCTION

As global concerns over climate change intensify, the imperative to reduce carbon emissions has become a shared global objective. A striking statistic underscores the significance of this challenge: approximately 33% of global greenhouse gas emissions and nearly 40% of global resource and energy consumption stem from building-related activities, construction is among of them (Deng, Li & Quigley, 2012). Beyond their energy consumption, construction endeavors generate substantial waste (Yusof, Awang & Iranmanesh, 2017), making the construction sector essential in the pursuit of sustainable development (Feliciano & Prosperi, 2011).

Research by Dwaikat & Ali (2016) demonstrated that the development of green buildings in Malaysia resulted in a remarkable 71.1% reduction in energy consumption compared to industry baselines. These green structures, in addition to curbing energy usage and carbon emissions, yield benefits such as lowered operational expenses, reduced waste-related costs, and enhanced environmental quality (Dwaikat & Ali, 2018). Notably, the incorporation of green features, whether within individual units or common areas, significantly influences household energy consumption and offers potential utility cost savings.

Given the distinct urgency of global climate concerns and the pivotal role of the real estate industry in environmental preservation (Deng et al., 2012), society has grown increasingly attuned to the attributes of environmentally friendly buildings (Fuerst & McAllister, 2011). Prospective buyers of residential properties emerge as pivotal actors in realizing the sustainability objectives of green buildings, necessitating alignment between developers and buyer preferences regarding green features. An exploration of potential homeowners' willingness to invest in green features can unveil their true appreciation of green building attributes and their commitment to real-world sustainability practices (Hostetler & Noiseux, 2010). Armed with insights into buyers' preferences, developers can tailor their offerings to align with these preferences. This study endeavors to elucidate the willingness to pay for green features among prospective homeowners within the Malaysian context.

2. GREEN BUILDING FEATURES OFFERED IN RESIDENTIAL BUILDINGS

According to Li, Long & Chen (2018), green buildings are buildings that provide people with healthy and comfortable living spaces, fully utilizing natural resources while minimizing the impact on the environment. Green building usually covers wide range of environmentally friendly aspects, to conserve energy and water, reduce waste, and increase air quality. Green building is described by Muldavin (2010) as an outcome of building performance determined by green features, strategies, and certification. The demand of green residential properties has increased as residents have started to consider the benefits of green feature performance and it has become an important factor when selecting a property (Aroul & Rodriguez, 2017). Residents are likely to purchase a green residential property with a higher price if they intended to enjoy a healthy and quality lifestyle (Hu, Geertman & Hooimeijer, 2014).

Fowler and Rauch (2006) explained that sustainable ratings or accreditation systems are used to examine the performance or expected performance of an entire building and translate performance assessments into a tool that can be used to compare the building performance of other buildings or a performance standard. The green rating tool that is developed and adopted for a local market can be used to evaluate whether a property is considered green (Runde & Thoyre, 2010), considering different countries likely to adopt different green building accredidation tools and systems. For example, the Leaderhip in Energy and Environmental Design (LEED) in the United States, Building

Research Establishment Environment Assessment Method (BREEAM) in the United Kingdom, Green Star in Australia, Green Mark in Singpore, and in Malaysia, the Green Building Index (GBI), GreenRe (by the Real Estate Housing Development Authority (REHDA)), Malacca Green Seal (by Malacca Green Development Organisation (MGDO)), Green Pass (by the Construction Industry Development Board (CIDB)), *Penarafan Hijau* (Green Ranking by the Public Works Department (JKR)), MyCREST (by CIDB-JKR), and CASBEE Iskandar (IRDA-Japan). Among the two most common Green Building Accredidation systems used in Malaysia are GBI and GreenRE, which are summerised in Table 1 below.

Table 1: A Comparison of the Green Building Criteria for GBI and Green RE for Residential Building

Criteria	GBI	GreenRE	Total
Energy Efficiency	23	54	38.5%
Water Efficiency	12	8	10.0%
Indoor Environment Quality	12	4	8.0%
Site Planning and Management	33	-	16.5%
Innovation	8	4	6.0%
Materials & Resources	12	-	6.0%
Environment protection	-	28	14.0%
Carbon Emission of Development	-	2	1.0%
Total	100%	100%	100%

Source: Author Compilation

GBI and GreenRE developed six criteria that are similar but differ in their weightage of scores. GBI places more emphasis on Site Planning and Management and Energy Efficiency, whereas GreenRE emphasizes Energy Efficiency and Environment Protection. Compared to GBI, GreenRE substituted Environmental Protection for the Materials and Resources and Site Planning and Management criteria. It was noted that the Innovation criteria in GBI were equivalent to the other Green Feature criteria in GreenRE, as both encourage the possibility of new ideas in green features and building design.

The main benefits of green buildings are enhanced occupant health and wellbeing though a quality environment and reduced energy consumption as well as cost savings during the operational phase of a building (Wadu, Mesthrige & Kwong, 2018). These criteria were observed as achievable characteristics through a literature search that summarized green features into four categories: (1) Energy Efficiency; (2) Indoor Environment Quality; (3) Water Efficiency; and (4) Innovation and Other Green Features as shown in Table 2.

Table 2: Summary of Green Features Available In Residential Properties

Category	List of Green Features	Previous Studies
Energy-Efficiency	1. Solar Photovoltaic 2. Solar Shading 3. Wall Insulation Material 4. High-performance Glazing 5. Green Roof 6. Lighting with Motion Sensor	- Gul, Kotak & Muneer (2016) - Jeon, Ryu & Lee (2010) - Evangelisti, Guattari, Asdrubali & de Lieto Vollaro (2020) - Ozel (2013) - Meng, Gao, Wang, Yan, Zhang & Long(2015) - Wang, Huang & Heng(2007) - Ascione, Bianco, de' Rossi, Turni & Vanoli (2013) - Dikel, Newsham, Xue & Valdés (2018)
Indoor Environmental Quality	1. Low Toxicity Finishes and Furnishings 2. Natural Ventilation Design 3. Sufficient Daylight 4. Sound Insulation Design	- Uhde & Salthammer (2007) - Heracleous & Michael (2019) - Deru & Burns (2003) - Turan, Chegut, Fink & Reinhart (2020) - Berglund, Lindvall & Schwela (2000) - Ryu & Song (2019) - ISO (2013)
Water Efficiency	1. Water Efficient Fittings 2. Rainwater Harvesting System	- Lee & Tansel (2012) - Cheng, Peng, Ho, Liao & Chern (2016) - GBI (2020) - Kenway et al. (2015) - Mehrabadi, Saghafian & Haghighi Fashi (2013) - Abu-Zreig, Ababneh & Abdullah (2019)
Innovation and Other Green Features	1. Building Passive Cooling Design 2. Other Innovations	- GreenRE (2017) - Darko, Chan, Effah, He & Olanipekun (2017) - GBI (2020)

Source: Author Compilation

A desktop search was conducted to identify the list of green features that had been adopted and made available in existing residential properties. Studies scope was drawn down to the Iskandar Development Region, which is the main southern development corridor and economy hub in Johor, Malaysia, It has recorded a cumulative investment of about RM332.11 billion from 2006 to 2020, and numerous new residential projects have been announced and developed in the region, it is also the place where the questionnaire survey was conducted. The search provided insight into how

green tools were implemented by developers in existing projects and ensured that green features were currently offered by developers. Table 3 below provides an overview of the green features available in existing residential properties located in Iskandar, Malaysia.

Table 3: List of Green features made available by the developer in the existing residential properties in Iskandar, Malaysia

Project	List of Green features
Imperia Puteri Harbour Developer: UEM Group Berhad	Waste separation and recycling, green power, automated watering system, roof garden, and automated lighting
Forest City Developer: Country Garden Pacificview Sdn Bhd	Natural lighting, motion sensor lights, vertical greenery, rooftop garden, natural ventilation, rainwater harvest, water efficient fittings, and sound insulation design
Kempas Utama Township Developer: IOI Properties Group Berhad	Solar water heating system, rain water harvesting system, and smart home system
EcoBotanic Developer: EcoWorld Development Group Berhad	Solar PV, energy efficient electrical and mechanical appliances, natural ventilation, natural lighting, shading, cool roof, rainwater harvesting system, water efficient fittings, edible garden, recycling centre, composting centre, and solar water heater
Rumah Iskandar Malaysia Developer: Iskandar Regional Development Authority (IRDA)	Rainwater harvesting system, solar panel, cool roof system, eco-friendly paint, and green paver blocks
Citrine Residences Developer: Sunway Iskandar Sdn Bhd	Natural lighting, natural ventilation, and rainwater harvesting system
Sakura Residences Developer: Sunway Iskandar Sdn Bhd	Energy efficient appliances, solar insulation, and air ventilation systems.

Source: Author Compilation

A comparison was made between the green features listed in the literature, GBI, and GreenRE (Table 2) as well as the List of Green features made available by developers in existing residential properties in Iskandar, Malaysia (see Table 3). Only the Green features offered by a developer and supported by literature were included in the questionnaire. We categorized green features into four criteria that were used to develop the questionnaire, which are shown in Table 4.

Table 4: Selection and Integration Of Green Features Listed In The Literature, GBI and Green RE as well as The Green Features Made Available by Developers in Existing Residential Properties

Criteria	Selection of Green Features
Energy-Efficiency	1. Solar Photovoltaic 2. Solar Shading 3. Green Roof or Roof garden 4. Lighting with Motion Sensor 5. Solar Water Heating System
Indoor Environmental Quality	1. Low Toxicity Finished and Furnishing 2. Natural Ventilation 3. Natural Daylighting 4. Sound Insulation Design
Water Efficiency	1. Water Efficient Fittings 2. Rainwater Harvesting System
Innovation and Other Green Features	1. Building Passive Cooling Design such as Cool Roof and Vertical Greenery 2. Smart Home System

Source: Author Compilation

It can be seen that developers and building design professionals were familiar and kept pace with the guides provided by local green rating agencies. Although developers have shown an effort to implement green features into the building design, not all are keen to fulfill and make available all green feature criteria and attain high ratings in the GBI and GreenRE assessment tools. Among the green features listed in the rating tools, natural lighting, natural ventilation, rainwater harvesting systems, and motion sensor lights are the features most commonly made available by developers in existing residential properties.

It was also found that some developers were more innovative by adding other green features such as solar water heating systems, vertical greenery, automated watering systems, smart home systems, water separation and recycling, composting centres, green paver blocks, and edible gardens.

3. METHODOLOGY

A survey was carried out to determine the willingness to pay for the buyers of each particular green feature to understand their intentions to purchase a residential property with that feature. The non-probability sampling method was used in this study to select samples from the targeted population. Nonprobability sampling is a sampling technique where samples are gathered in a process that does not give all participants or units in the population an equal chance of being included (Etikan, 2016). When using this sampling method, only a small number or part of a population is required to make a conclusion regarding the whole population. However, this sampling method can still provide valid and credible results. This is because this sampling method is able to reflect the characteristics of the population from which respondents are selected. For this research study, the convenience sampling method was selected for the distribution of the questionnaire survey. The questionnaire survey was distributed through an electronic survey to potential buyers who intended to purchase a residential property located in the Iskandar, Malaysia Region in the near future for their usage or investment purposes. A partial respondent list was obtained from the customers of local developers, and this list was further extended through the snowballing sampling technique. Findings

have shown that email and Internet-facilitated surveys can yield higher returns at a lower cost per returned questionnaire (Al-Omiri, 2007). Moreover, such surveys are also a relatively inexpensive and expedient means of communicating with respondents, while facilitating a convenient way of correcting misunderstandings and following up on missing data. Studies have also shown that a hard-to-reach audience can be reached by the implementation of an electronic survey (Andrews et al., 2010).

The questionnaire consisted of two parts. Part A asked about the demographic background of each respondent and Part B list out the green features identified through the comparison of green features listed in the literature, GBI, and GreenRE, that were available by developers in the existing residential properties. Respondents were asked to fill in the percentage of premium he or she was willing to pay for each of the listed green features on top of the property price. Example:

"How much are you willing to pay for each of the following green features on top of the property price?"

Solar Photovoltaic	_____*%*

A total of 830 sets of questionnaires in the electronic format were distributed to potential buyers of a residential property in Iskandar, Malaysia via online distribution through the convenience sampling method. Buyers are contacted through emails. Based on the return rate of the completed questionnaire survey forms, this study had 410 respondents. 16 respondents were voided due to unreasonable responses. Overall, the response rate for this study was 49.3%.

4. FINDINGS

The collected data was submitted for descriptive analysis. The demographic background of the respondents was summarized in Section A of the questionnaire. Descriptive statistics calculate the number of respondents for each category, including gender, educational background, annual household income, etc. The purpose of descriptive analysis is to understand the demographic profiles of respondents and to identify whether they have plans to buy a residential property within the next three years. Respondent demographics are presented in Table 5.

Table 5: Respondent Demographics

Variable	Description	Percentage (%)
Gender	Female	58.6
	Male	41.4
Age	21-30	54.8
	31-40	15.7
	41-50	7.6
	51-60	16.2
	Above 60	5.6
Education Level	Degree	57.6
	Diploma	14.2
	Lower Secondary	5.1
	Master	6.6
	PhD	1.8
Annual Household Income	Above RM120,000	7.6
	Below RM24,000	34.0
	RM24,000 - RM36,000	18.8
	RM36,000 - RM48,000	13.2
	RM48,000 - RM60,000	10.4
	RM60,000 - RM120,000	16.0
Plan to buy a residential property within the next three (3) years	Yes	49.5
	No	50.5

Source: Author Compilation

In Part B of the questionnaire, the respondent was asked to fill in the percentage of premium he or she was willing to pay for specific green features on top of the property price. The green features were arranged according to the four common criteria shared by the Green Building Index and GreenRE, which were:(1) Energy Efficiency; (2) Indoor Environment Quality; (3) Water Efficiency; and (4) Innovation and Others. Frequency analysis was adopted to analyse their suggested percentage of the premium. The results will help researchers identify users' willingness to pay for each specific green feature available in a residential property.

Table 6: Percentage Premium for Each Green Feature

	Descriptive Statistics	
	N	Mean
Energy Efficiency (EE)		
Solar Shading Device	394	4.99%
Solar Water Heating System	394	5.22%
Green Roof or Roof Garden	394	5.25%
Solar Photovoltaic	394	5.47%
Lighting with Motion Sensor	394	5.51%
Indoor Environmental Quality (IEQ)		
Low Toxicity Finishes and Furnishing	394	5.83%
Natural Ventilation Design	394	6.36%
Sound Insulation Design	394	6.66%
Sufficient Day Lighting	394	6.95%
Water Efficiency (WE)		
Rainwater Harvesting System	394	5.59%
Water Efficient Fittings	394	6.23%
Innovation and Others (IO)		
Building Passive Cooling Design	394	6.62%
Smart Home System	394	7.25%

Source: Author Compilation

Among the 13 listed green features, the study found that users had the greatest willingness to pay for Smart Home System (μ=7.25%), followed by Sufficient Day Lighting (μ=6.95%), Sound Insulation Design (μ=6.66%), Building Passive Cooling Design (μ=6.62%), and Natural Ventilation Design (μ=6.36%). The study found that users had a higher willingness to pay for green features in the "Indoor Environment Quality (IEQ)" and "Innovation and Others (IO)" criteria.

The study also found that users had relatively lower willingness to pay for Solar Shading Device (μ=4.99%), followed by Solar Water Heating System (μ=5.22%), Green Roof or Roof Garden (μ=5.25%), Solar Photovoltaic (μ= 5.47%), Lighting with Motion Sensor (μ=5.51%), and Rainwater Harvesting System (μ=5.59%). It was established that the willingness to pay for green features in the "Energy Efficiency (EE)" and "Water Efficiency (WE)" criteria were relatively lower than the other criteria. Among these two criteria (EE and WE), building users show a higher willingness to pay for Water Efficient Fittings (μ=6.23%).

4.1 Chi-square Test of Independence

The Chi-Square Test of Independence was adopted to analyse the relationship between the intention to buy a house within the next three years and the willingness to pay for each specific green feature available in a residential property. A significant likelihood ratio greater than 0.05 indicates that there is no association between the intention to buy a house within the next three years and the willingness to pay for each specific green feature available in a residential property, while a significance level less than 0.5 indicates the opposite. In the case where the alternative hypotheses ($\alpha \leq 0.05$) were accepted, Cramer's V value was then used to determine the measure of association. Cramer's V values equivalent to or lesser than 0.2 indicated a weak association, Cramer's V values greater than 0.2 but smaller than 0.3 indicated a moderate association, while Cramer's V values greater than 0.3 indicated a strong association between two variables.

In this study, it was found that the majority of respondents' willingness to pay for green features had no association with their plans to buy a house within the next three years, except the willingness to pay for Solar Photovoltaic and Low Toxicity Finishes and Finishing. A Cramer's V value (0.316) greater than 0.3 indicates that a plan to buy a house within the next three years had a strong and significant effect on a respondent's willingness to pay for solar photovoltaics. A Cramer's V value (0.282) between 0.2 and 0.3 indicates that a plan to buy a house within the next three years had a moderately significant effect on a respondent's willingness to pay for low toxicity finishes and finishing.

Table 7: Chi-Square Tests for "Are you planning to buy a residential property within the next three (3) years?" *Solar Photovoltaic

	Value	df	Asymptotic Significance (2-Sided)
Pearson's Chi-Square	39.222a	20	.006
Likelihood Ratio	42.889	20	.002
N of Valid Cases	394		

Table 8: Symmetric Measures for "Are you planning to buy a residential property within the next three (3) years?" *Solar Photovoltaic

		Value	Approximate Significance
Nominal by Nominal	Phi	.316	.006
	Cramer's V	.316	.006
N of Valid Cases		394	

Table 7 and 8 each show the Chi-Square Tests and Symmetric Measures, respectively, for "*Are you planning to buy a residential property within the next three (3) years?*" *Solar Photovoltaic. The asymptotic significance value (0.002) showed a likelihood ratio of less than 0.05. The null hypothesis was rejected and the alternative hypothesis was accepted. There was an association between the plan to buy a house within the next three years and the willingness to pay for solar photovoltaics. The Cramer's V value (0.316) was greater than 0.3, indicating that a plan to buy a house within the next three years has a strong and significant effect on the willingness to pay for solar photovoltaics.

Table 9: Chi-Square Tests for "Are you planning to buy a residential property within the next three (3) Years" *Low Toxicity Finishes and Furnishing

	Value	df	Asymptotic Significance (2-Sided)
Pearson's Chi-Square	31.303[a]	20	.051
Likelihood Ratio	36.049	20	.015
N of Valid Cases	394		

Table 10: Symmetric Measures for "Are you planning to buy a residential property within the next three (3) years?" *Low Toxicity Finishes and Furnishing

		Value	Approximate Significance
Nominal by Nominal	Phi	.282	.051
	Cramer's V	.282	.051
N of Valid Cases		394	

Table 9 and 10 each show the Chi-Square Tests and Symmetric Measures, respectively, for "*Are you planning to buy a residential property within the next three (3) years?*" *Low Toxicity Finishes and Furnishing. The asymptotic significance value (0.015) showed a likelihood ratio of less than 0.05. The null hypothesis was rejected, and the alternative hypothesis was accepted. There was an association between a plan to buy a house within the next three years and the willingness to pay for low toxicity finishes and furnishing. The Cramer's V value (0.282) was greater than 0.2 but less than 0.3, indicating that a plan to buy a house within the next three years has a moderate but significant effect on the willingness to pay for low toxicity finishes and furnishing.

4.2 Discussion

The study found that the respondents had a higher willingness to pay for the green features in the "Indoor Environment Quality (IEQ)" and "Innovation and Others (IO)" criteria. Among the 13 listed green features, respondents showed the highest willingness to pay for Smart Home System (μ=7.25%). Smart home services are developing and proliferating today through the adoption of the Internet of Things (IoT) and Artificial Intelligence (AI) (Yang, Lee & Lee, 2018). Malaysian smart home is projected to reach US$195m in the year 2021 (Statista, 2020). It was found that the components of safety and security controls were the main features that made a majority of respondents more willing to pay to install Smart Home Systems in their houses (Hidayati, Mokhtar & Ismail, 2018).

The overall willingness to pay for green features in the "Indoor Environment Quality (IEQ)" criteria is high because of the hot and humid weather in Malaysia. Nevertheless, Malaysia also has plenty of rainfall and erratic wind movements throughout the year, making it rational to integrate both passive and active designs into a building (Al-Obaidi, Ismail & Abdul Rahman, 2014), as negligence towards climate control in the design of residential buildings can lead to uncomfortable indoor thermal conditions, affecting the efficiency, health, and quality of life of residents (Jamaludin, Mohammed, Khamidi & Wahab, 2015). When deciding to buy a house, comfort is the most important factor for house buyers or owners. The hot and humid climate of Malaysia has become the main factor that makes house owners willing to make financial

compensation or pay extra for green features that contribute to increased indoor environment quality and have cooler and more comfortable internal temperatures.

Passive cooling techniques showed a high willingness to pay from building users, probably because Free Running (FR) passive cooling strategies are effective for indoor thermal environments in a Malaysian two-storey terrace house (Tuck et al. 2019). The installation of ceiling insulation and window shading systems in Malaysian terraced houses helps decrease operating temperatures in the afternoon (Kubota, Chyee & Ahmad, 2009). Night-time ventilation has also been found to be efficient in reducing the nocturnal use of air-conditioners. Building users also rely on passive cooling by opening windows instead of solely relying on the use of air-conditioners and electric fans when maintaining thermal comfort. These passive cooling techniques contribute to energy savings and are efficient at reducing household running costs (Majid, Salehudin, Rahim & Othman, 2015).

Apart from indoor thermal comfort, the indoor noise environment, taking into account the sound insulation of building components such as floors, walls, and windows, is an important factor in the selection of residential buildings (Jeon et al., 2010). Building users or owners are willing to pay more for sound insulation to avoid noise from the external environment and to increase privacy. On the other hand, it is established in this study that the willingness to pay for green features in the "Energy Efficiency (EE)" and "Water Efficiency (WE)" criteria was relatively lower than the other criteria. Among these two criteria (EE and WE), building users showed a higher willingness to pay for Water Efficient Fittings (μ=6.23%). The debate over whether the inclusion of other energy efficiency and sustainable systems, such as rainwater harvesting (μ=5.59%) and solar panels (μ=5.47%) is essential seems to be even-handed (Majid et al., 2015). Respondents perceived that although these green features might provide certain advantages but were not necessarily willing to pay more money just to include them in the house.

Building users showed an inclination toward energy efficiency in houses while comfort (64%) and privacy (47%) were the main considerations in choosing and building new houses (Majid, et al, 2015). Residents were willing to pay more when purchasing a green residential property as they needed a safe and healthy environment in which to reside and enjoy their lives (Hu, Geertman & Hooimeijer, 2014). Occupants found it pertinent to install air conditioning for their indoor comfort, which contributes to increased energy usage in a building (Jamaludin, Mohammed, Khamidi & Wahab, 2015). The overall lower willingness to pay for "energy-efficiency (EE)" green features can be attributed to the low electricity tariff in Malaysia. However, low energy prices and a lack of financial incentives for energy efficiency are key barriers that have prevented the widespread adoption of energy-efficient practices in Malaysia. Low energy prices prevent energy efficiency as consumers are less concerned about energy costs. Furthermore, the return from energy efficiency investments will take longer as returns in terms of energy savings are small due to low energy prices. Moreover, dedicated finance for energy efficiency from commercial lending institutions has been difficult to obtain, as banks have not built sufficient capacity to deal with energy efficiency project evaluation and project finance schemes. The lower willingness to pay for "Water Efficiency (WE)" green features can be attributed to the low water tariff in Malaysia. This low tariff does not encourage new water reduction technology innovations and stands in contrast to the Green Technology aspirations (Malek, Nor & Leong, 2013). As demand is price-responsive, low water pricing has caused severe water wastage. The ability of almost all households in Malaysia to pay a low-priced water bill has contributed to the extravagant use of water and

poor water conservation in the nation (Chan, 2009). Furthermore, most respondents will consider changing domestic activities to use less water and changing their behaviour before considering water conservation technologies (Adeyeye, 2012).

In this study, it was found that the majority of respondents' willingness to pay for green features had no association with their plans to buy a house within the next three years, except the willingness to pay for Solar Photovoltaic and Low Toxicity Finishes and Finishing. Regarding solar photovoltaics, the Sustainable Energy Development Authority (SEDA) in Malaysia and Tenaga National Malaysia, the only electricity utility company have promoted the benefits of installing solar panels in Malaysia and are well-received by the public. Feed-in tariff for solar panels is available in Malaysia and there is an opportunity that the energy generated from the energy produced to the utility grid at a premium Rate. However, the public may still take further caution when it comes to installing and investing in solar panels. Mariadas, Abdullah & Abdullah (2019) found that financial factors had a positive relationship with residential property purchase decisions. The period for the payment, interest rate, ability to meet monthly payments, and mortgages were included in financial factors, and there are some hidden costs, such as homeowner insurance premiums and utilities, that needed to be considered. The initial cost of installing photovoltaic (PV) panel systems has also become a major consideration for house owners when adopting green features (Gul et al., 2016). The components of a residential solar PV system may include solar array mounting racks, inverters, array DC disconnects, battery packs, breaker panels, AC panels, and circuit breaker panels. This means it will take around RM60,000 or more for a full collection of solar PVs, excluding installation costs (Solar Panel Malaysia, 2020). The homeowners may have to use personal loans to install the solar panels for their homes.

The findings also suggest that the plan to buy a house within the next three years has a moderate but significant effect on the willingness to pay for low-toxicity finishes and furnishing. When choosing the finish and finishing materials for a house, the main consideration of a house owner is how the finishes will make the interior appealing, beautiful, and attractive. The second utmost important matter is the hygiene and health factor (Zinas, 2013). The cost of opting for non-toxicity finishes and finishing such as low VOC paint will be higher than their counterparts. However, it is worth the extra cost when compared to the reduced risk of chemical harm during application and future occupation. When moving into a new house, the pungent smell of the newly applied finishes and finishing will often be a main concern for house occupants (Freed & Daum, 2010). The odour intensity and the potential particle reaction among reactive compounds and reaction products can hurt the health of a building occupant. House owners are willing to pay more for low-toxicity finishes and finishing to reduce the negative impact of allergy-causing toxins. Overall, the results revealed that the green features contribute most to providing users was home experience and comfort, which represents how much a user feels comfortable and engaged when at home. This was observed through a higher willingness to pay of such features by building users.

5. CONCLUSION

Overall, the results revealed that the green features that contribute most to a user's willingness to pay were comfort and a better home experience. The "Smart Home System" had the highest mean score for a user's willingness to pay while the "Green Roof or Roof Garden" had the lowest mean score for a user's willingness to pay. This study found that users had a higher willingness to pay for

green features in the "Indoor Environment Quality (IEQ)" and "Innovation and Others (IO)" criteria. The willingness to pay for green features in the "Energy Efficiency (EE)" and "Water Efficiency (WE)" criteria was relatively low.

In this study, it was found that the majority of the willingness to pay for green features had no association with an intention to buy a house within the next three years, while the willingness to pay for Solar Photovoltaic and Low Toxicity Finishes and Finishing has an association with an intention to buy a house within the next three years. As this research focuses on identifying the willingness to pay for each specific green feature available in a residential property, the results will be best applied and provide the biggest advantages to property developers, real estate agents, and home buyers themselves. Although developers have made an effort to implement green features into building design, not all are keen to or have made efforts to fulfil the needs and demands of buyers. Looking into the green features that have been made available in existing residential properties, it was found that green features with a lower willingness to pay were Solar Water heating System (μ=5.22%). Green Roof or Roof Gardens (μ=5.25%) and Rainwater Harvesting System (μ=5.59%) were the green features that are most made available by developers in existing residential properties.

Developers who wish to undertake a green residential project should seize the initiative to incorporate green features with a high willingness to pay by users, as an implementation of a premium pricing strategy that will maximise profits. Therefore, referring back to the research findings, residential properties are suggested to incorporate green features in the "Innovation and Others (IO)" and "Indoor Environmental Quality" criteria. Smart Home System (μ=7.25%) is a rising trend that is most demanded by residential property buyers and users in this Internet of Things (IoT) era. The focus should also be to green features that provide comfort, especially indoor thermal comfort, and privacy to residential property users, such as Sufficient Day Lighting (μ=6.95%), Sound Insulation Design (μ=6.66%), Building Passive Cooling Design (μ=6.62%), and Natural Ventilation Design (μ=6.49).

The findings mentioned herein should be regarded in the light of certain limitations. First, this study focused on the Iskandar, Malaysia region and therefore cannot be generalized to the entire population. In addition, a questionnaire was distributed in electronic form to potential house buyers, which may cause bias that reduces the overall validity of this analysis. The researcher may have had a limited capacity to gain access to participants or an appropriate type or within a certain geographic scope. It is recommended that in future studies, questionnaires be distributed face-to-face in order to increase the representativeness and validity of the study. It is also recommended that the willingness to pay for green features be identified using some other method, besides the Contingent Valuation Method, in the Stated Preference Techniques. Other valuation approaches such as the Revealed Preference Technique can also be used to identify the willingness to pay for green features.

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THE DETERMINANTS OF MACROECONOMIC FACTORS ON THE RETURN OF REAL ESTATE INVESTMENT TRUSTS IN MALAYSIA

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ABSTRACT

The purpose of this study is to examine the macroeconomic determinants on real estate investment trusts (REITs) return volatility in Malaysia. The sample period of this study is eight years from 2010 Q1 to 2017 Q4. In this study, the REIT return volatility and its macroeconomic determinants are examined. This study employed Autoregressive Conditional Heteroscedasticity (ARCH) and Generalised Autoregressive Conditional Heteroscedasticity (GARCH) models to assess the volatility for REIT returns. Furthermore, the analysis also aims to evaluate the significance of macroeconomic determinants on REIT return volatility in Malaysia. The findings revealed several macroeconomic factors such as Base Lending Rate (BLR), money supply, industrial production, Gross Domestic Product (GDP) and Consumer Price Index (CPI) were the major factors in determining the return of REITs in Malaysia. This study has an implication for investors and fund managers when they have to consider REIT return volatility in investment decision-strategic decision making. This research will also provide more information on the REIT investment risk levels as the property portfolio market has become more complex and requires more transparency in terms of information.

Keywords: *Determinants, macroeconomics, factors, return, REITs, Malaysia*

1. INTRODUCTION

REITs are investment vehicles in many financial markets, especially in Europe and Asia, although they have more than half a century of history in the United States (Stevenson 2013). It is worth noting that it is necessary to understand that mature and developed markets, such as Japan and the UK, launched their REITs only after the turn of the millennium in 2000 and 2007 respectively. Malaysia real estate investment trusts (M-REITs) are the unitised portfolio of property assets, listed on the Bursa Malaysia Stock Exchange which allows investors to purchase diversified and professionally managed real estate portfolios.

The development of M-REITs began in 2006. The market for REITs has shown substantial growth rates in the last decade in Malaysia. The total market capitalisation of the M-REIT market has grown significantly from just RM1.8 billion at the end of 2005 to a considerable RM46 billion in December 2017. Nevertheless, the two major financial crises in 1997 and 2008 have made investors take more precautionary measures in terms of financial market conditions. Consequently, the information from the market has become vital. Hence, investors began to study, analyse, understand and manage the risk of their portfolio investments. They were concerned of the risk and return by investment analysis. The market efficiency has evolved due to the complexity of several external factors, especially macroeconomic factors.

There is very limited literature available on the macroeconomic determinant of REIT returns over the past decades in Malaysia. Abdullah and Zahari (2011); Lee and Ting (2009); Ting (2002); and Ting and Tan (2008) focused on the Malaysian real estate market, focusing only on the performance of REITs. These researchers conducted extensive research on the performance of real estate portfolios in China and Hong Kong to reflect the performance of Malaysia and other Asian countries to show the performance of each country. Therefore, it is important to make Malaysia a major case study so that local property stakeholders can better understand the macroeconomic determinants of the real estate industry, especially REITs. Hence, the form of market efficiency in Malaysia can only be determined when a reliable test and study is undertaken. Researchers have also been making efforts to find the answer to the question: what should be the most significant macroeconomic determinants that affect the return of REIT stocks?

Since real estate is an integral part of the economy, its revenue is closely related to the macroeconomic and business environment (Liu & Mei, 1992). For instance, Chan et al. (1990); Gyourko and Keim (1992); and Peterson and Hsieh (1997) all concluded that the risk premiums of equity REITs correlate to that of common stock returns. In addition, some studies such as Ling and Naranjo (1997) and Mei and Hu (2000) considered the economic factors of income and the time-varying aspect of risk premium. There is no doubt that research in this area has greatly improved investor understanding of the macroeconomic impact of real estate investment performance.

Research on econometric analysis preferences such as ARCH, GARCH, and EGARCH still lacks research, especially for the study of M-REIT's return volatility. Although Liow (2012) used the EGARCH model, the analysis focused only on the common changes and correlations of the Asian securitised real estate market and the stock market. Liow (2012) used only Malaysia as a comparative case study. Moreover, only Liow used GARCH as a technique in his analysis. Therefore, it is believed that this study will be the first to use a variety of econometric techniques to evaluate the volatility of REIT returns. Pham (2012) studied the returns of the Asian REIT market and the dynamics of volatility spillovers. However, the focus of these studies is based on the general Asian perspective.

The significant of REIT return volatility has been studied by several researchers. The study of the relationship between the REITs and volatilities of macroeconomic factors in developing markets (Bulgaria and South Africa) and a 'benchmark' developed market were investigated by Kola and Kodongo (2017). They found that macroeconomic risk cannot explain excess returns on REITs. However, they documented a positive correlation between REIT fund returns and the real economy in the United States. Loo et al. (2015) undertook research on the integration between Asian REIT markets and macroeconomic variables and found that some emerging REIT markets have already shown a higher degree of integration with macroeconomic variables. This means that the emerging REIT market is more sensitive to changes in the macroeconomic environment than the developed REIT market.

In summary, a study of the determinants of macroeconomic factors to M-REITs is important but also inevitable, due to the challenges in the financial markets. Investors need to be informed and local markets are pressured to be more transparent. Previous studies in other countries have shown that macroeconomic factors are very important and are capable of influencing the return of REIT portfolio markets. The findings of this study provide more understanding and valuable information about REITs, thus helping investors to redefine their investment strategies and make sound decision in every investment. Besides that, this study can assist investors in analysing REITs compared with other investment tools.

2. REAL ESTATE INVESTMENT TRUSTS IN MALAYSIA

REITs provide investment opportunities and channels for individual and institutional investors, and also allow small investors to enter the real estate market with a small amount of funds. According to Boon and Phuah (2005), a REIT is one type of collective investment that is involved in real estate and real estate related assets. Examples for real estate sectors include office properties, industrial facilities such as warehouses and distribution centres, retail properties, lodging facilities such as hotels, residential properties such as apartment buildings, student housing, manufactured homes and single-family homes, timberland properties, healthcare-related properties, storage facilities, industrial infrastructure properties and other sectors. While there are variances in terms of ownership, dividend distribution, borrowing limits and other requirements for REITs in every country (Phuah, 2005).

Malaysia is the first Asian country to develop the REIT market. It was previously called Public Trusts Funds (PTFs) in 1986. Malaysia uses Australia's Listed Property Companies (LPTs) model to establish a regulatory framework, although the structure has several different aspects. This is mainly because of restrictions on the "birth of earth" rule that favours foreign investment in Malaysia. The first regulatory framework was approved by Bank Negara Malaysia (Central Bank of Malaysia). Its regulatory principles include the Company Act 1965 and the Securities Act 1983 (Rozali & Hamzah, 2006). Later, when the Securities Commission (SC) was established, it became a regulatory agency. The specific guiding principles for PTF were introduced by the SC in 1991 and later revised in 1995 and 2002. The published performances of REITs were very limited in the Malaysia context. Newell et al. (2002) found that although Malaysia was the first Asian country to develop REITs, based on risk-adjusted performance analysis, they noted that M-REITs performed poorly. Factors that constrained the development of LPTs in Malaysia (Shun 2003; Ting, 1999) were:

i. Lack of demand and poor perception for the product amongst investors;
ii. Properties available for acquisition provided a low yield and Malaysia had too few institutional investors;

iii. Strong performance by competing investment options; and
iv. Local investment psyche favoured speculative investment.

In 2010, Malaysia revised its guidelines again to provide a regulatory framework that would protect the interest of investors and facilitate the development of the REIT industry. The revised regulation would push future investing in REITs in Malaysia towards a global investment and attempt to attract more REITs to be list in Bursa Malaysia in the future.

As of 31 December 2017, there were 18 M-REITs with a total market capitalisation of RM46 billion listed on the Malaysian Stock Exchange (see Table 1). This made Malaysia the fourth-largest REIT market in Asia. However, compared with Japan, Singapore and Hong Kong, Malaysia's REIT industry is still relatively small. Four of the largest M-REITs are: KLCC REIT (RM11.48 billion), Pavilion REIT (RM5.74 billion), IGB REIT (RM5.62 billion) and Sunway REIT (RM4.88 billion), were among the top 50 REITs in Asia in terms of market value.

Table 1: Profile of Malaysian Real Estate Investment Trusts (M-REITs)

Company	Listed Date	Property Sector	Market (Million)	Cap	USD
KLCC REITs	May 2013	Retail	3,899.5		
Pavilion REIT	December 2012	Retail	1,626		
IGB REIT	September 2012	Retail	1,581		
Sunway REIT	July 2010	Diversified	13,111		
Capitalmall Malaysia TRT	July2010	Retail	777		
Axis REIT	August 2005	Office	462		
YTL Hospitality	December 2005	Retail	503		
Quill Capital TRT	January 2007	Office	334		
Al Aqar Healthcare REIT	August 2006	Speciality	260		
UOA REIT	December 2005	Office	171		
Hektar REIT	December 2006	Retail	150		
As Salam REIT	September 2015	Diversified	145		
Amanahraya REIT	February 2007	Diversified	130		
KIP REIT	January 2017	Retail	109		

3. MACROECONOMIC DETERMINANTS ON REITS

The study on macroeconomic determinants on REITs has been carried out by several researchers. According to the study of He and Ng (1994), they found that when examining the relationship between market fundamentals, economic power, and the stock market, several measures of macro risk are very important. In Loo et al.'s (2015) study, the emerging REIT market showed a higher degree of integration with macroeconomic variables over the long term. This means that the emerging REIT market is more sensitive to changes in the macroeconomic environment.

REIT returns have been empirically investigated in various markets with macroeconomic determinants such as industrial production growth, output growth, inflation, interest rates and term structure being

found to be important sources of systematic risk that directly affect real estate returns, particularly equity REITs (Chan et al., 1990; McCue & Kling, 1994). For example, a recent Bloomberg report suggests that a recovering economy and low-interest rates since the end of the recession have contributed to increasing yields of REITs in the US; consequently, higher interest rates can make REIT dividend yields less attractive in comparison to other securities such as bonds.

In a study of the US REIT market, it was pointed out that previously used macroeconomic variables were interest rates (Allen et al., 2000; Chen & Tzang, 1988; McCue & Kling, 1994), inflation (Chan et al. 1990; Chatrath & Liang, 1998; Chen & Tzang, 1988; Ewing & Payne, 2005; Glascock et al., 2002; Jirasakuldech & Emekter 2012; Liu et al. 2012; McCue & Kling 1994; Park et al. 1990; Simpson et al., 2007; Yobaccio et al., 1995; Yunus, 2012), industrial production (McCue & Kling, 1994), GDP (Chang et al., 2011; Ewing & Payne, 2005; Li & Lei, 2011; Yunus, 2012), and money supply (Anderson et al., 2012; Bredin et al., 2007, 2011; Chang et al., 2011; Ewing & Payne, 2005; Jirasakuldech & Emekter, 2012; Yunus, 2012).

In contrast, studies of the real estate market use macroeconomic variables that include interest rates (Liow & Yang, 2005; Stevenson et al., 2007), inflation (Lee et al., 2011; Liow & Yang, 2005; Yunus, 2012), industrial production (Lee et al., 2011), GDP (Liow & Yang, 2005; Yunus, 2012) and money supply (Lee et al., 2011; Liow & Yang, 2005; Xu & Yang, 2011; Yunus, 2012). In their study, Lee et al. (2011) found no evidence of the impact of money supply and industrial production on Malaysian and Taiwanese real estate stocks. However, Yunus (2012) found that Japanese real estate stocks were evidenced by long-term and short-term impacts of GDP, inflation, money supply, and long-term government bonds. Liow and Yang (2005) found that long-term perspectives were combined with factors such as GDP, inflation, short-term interest rates, long-term interest rates, and money supply in Japan, Hong Kong, Singapore, and Malaysian real estate stock markets.

A study by Yunus (2012) found that long-term relationships and short-term relationships between the US, Canada, Japan, Australia, Germany, France, Italy, the Netherlands, Switzerland and the UK with real estate stocks, inflation, and currencies were examined through macroeconomic factors such as GDP. With supply and long-term government bonds, the study found that each real estate market was co-integrated with macroeconomic variables, and these markets were also affected by the overall economy in the short term. Liow and Yang (2005) also proved the impact of the real estate stock markets in Japan, Hong Kong, Singapore and Malaysia on GDP, inflation, short-term interest rates, long-term interest rates and money supply. Chen and Tzang (1988) found similar results, in which real estate stocks met macroeconomic fundamentals. Overall, most studies showed significant relationship between REIT returns and macroeconomic determinants of interest rates, inflation rates, gross domestic product, money supply, industrial production and currency exchange rates.

Interest rates are one of the key determinants of market returns in the literature. Most studies have shown that there is a negative correlation between interest rates and stock prices, consistent with financial theory. Abdullah and Hayworth (1993) found that the return of the S&P 500 index is more closely related to the long-term interest rate than the short-term interest rate. Bulmash and Trivoli (1991) also observed similar negative correlations between long-term treasury bond rates and US stock prices, as well as the findings of Maysami and Koh (2000) in Singapore. Mukherjee and Naka (1995) found a mixed relationship between Tokyo stock market returns and interest rates. They found that there was a normal negative correlation between long-term government bond interest rates and market returns, but there was a controversial positive relationship between short-term interest rates and earnings.

In most studies, inflation, whether expected or unexpected, was negatively correlated with market returns. Bodie (1976); Chen et al. (1986); Fama and Schwert, (1977); Geske and Roll, (1983); Jaffe and Mandelker (1976); and Marshall (1992) demonstrated evidence of a negative correlation between US inflation and stock market returns. Hamao's (1988) study of the Japanese stock market is consistent with the US evidence. Bulmash and Trivoli (1991) pointed out that CPI is falsely related to stock prices. Mukherjee and Naka (1995) used Johansen's (1991) co-integration analysis to find that the Tokyo Stock Exchange (TSE) index movement was negatively correlated with changes in inflation in Japan.

Maysami and Koh (2000) showed an increase in evidence of negative co-integration between inflation and Singapore stock market returns. However, Abdullah and Hayworth (1993) found that the S&P 500 stock price index return was positively correlated with inflation. Nasseh and Strauss (2000) also pointed out that there were positive co-integration relationships between inflation and stock prices in six European countries: France, Italy, the Netherlands, Switzerland, the United Kingdom, and Germany. Ibrahim and Aziz (2003) and Ibrahim (2003) also found similar results in the Malaysian stock market. The Kuala Lumpur Composite Index (KLCI) was considered to be positively correlated with the Malaysian consumer price index. Bulmash and Trivoli (1991) showed that CPI is falsely related to stock prices.

Money supply is one of the factors that other macroeconomic variables are likely to explain stock market returns. The money supply was found to be positively correlated with the US stock price (Homa & Jaffee 1971; Palmer 1970; Rudolph 1972). The literature found evidence of positive co-integration between the supply of money and changes in stock prices. Habidullah (1998) also recorded strong positive correlations and the existence of long-term co-integration between the money supply (defined as M1 or M2) and the stock prices of the Malaysian stock market. Bulmash and Trivoli (1991) recorded a positive co-integration relationship between the changes in US stock prices and money supply.

Thornton's study (1998) pointed out that there is a significant positive correlation between the actual stock price in Germany and the long-term demand defined as the actual monetary balance of M1. Maysami and Koh (2000) also found positive but negligible co-integration between Singapore stock prices and money supply. Ibrahim (2003) found that Malaysian stock prices were positively correlated with money supply M1. However, Kwon and Shin (1999) found contrasting results, indicating that the stock price of the Korean stock market was negatively correlated with the money supply. Ibrahim and Aziz (2003) also recorded a negative co-integration between the Malaysian stock exchange price and the local money supply if it was defined as M2. Regarding causality, Hashemzadeh and Taylor (1998) pointed out that money supply and stock prices were two-way causality.

GDP is one of the most popular indicators used by researchers to represent economic conditions. It has the strongest influence on the development of the real estate industry. For example, many companies are undergoing restructuring and consolidation as the economy declines. In the study of Maysami and Koh (2000), the relationship between stock prices and real GDP showed a positive relationship. According to studies by Fama (1986), Ibrahim and Aziz (2003), and Mukherjee and Naka (1995), real GDP growth will affect stock prices by affecting corporate profits. This is because when the real GDP increases, the company's expected future cash flow will increase, and the stock price will increase.

There have been several studies conducted to investigate the impact of currency volatility on the share market. The results were generated differently from several studies in different countries.

Home country currency appreciation leads to an increase in home country share returns (Aggarwal, 1981; Muzindutsi, 2013). Qian (2011) provided a similar result but in a different direction. The study found that appreciated home country currency will cause an increase in the present value of expected future cash flows on foreign shares in foreign currencies. In contrast, Soenen and Hennigar (1988) reported that there has been a strong negative relationship between US dollar value and US stock indexes. These findings are supported by Moghadam and Moghadam (2016) who found negative relationships between exchange rates and stock prices as the change in 1 of exchange rate will bring a negative impact for stock prices in the size of -0.18 in Tehran.

Nath and Samanta (2003) provide a different point of view as the exchange rate and stock price are not interrelated in India. Research by Rahman and Uddin (2009) also supports Bangladesh, India, and Pakistan where there is no fixed relationship between the exchange rate and the stock market, there is no co-integration relationship, and there is no causal relationship. Market participants cannot use one part of market information to predict another market. Inci and Lee's (2014) results were in contrast with Nath and Samanta (2003) and Rahman and Uddin (2009); where the research found exchange rates and stock returns were significantly linked and their relationship even became stronger during recent years.

4. METHODOLOGY

In this study, the quarterly total return price changes for the 17 listed REITs in Bursa Malaysia from January 2010 to December 2017 will be assessed. There are a total 18 REITs listed in Bursa Malaysia as at 31 December 2017. To determine the applicability of REITs in this study, the REITs to be selected in this study must be listed in Bursa Malaysia after January 2015 until December 2017. Only quarterly price changes of the 17 listed REITs are collected for the study. The quarterly total return index of the listed REITs is collected from Thomson Reuters DataStream from the period of January 2010 to December 2017, which is the total study period of eight years.

The macroeconomic determinants for REITs which are identified from the literature review are Base Lending Rate (BLR), inflation rate, industrial production, GDP, money supply and currency exchange rates. This data will be obtained from the Datastream service by Thomson Reuters. All variables will be computed into natural logarithms except BLR, CPI, industrial production and currency exchange rate. The "LOG" function is used to convert the RM millions in industrial production, GDP and money supply into smaller values. The natural logarithm of a number is its logarithm to the base of the mathematical constant, which can be convenient in calculating and getting the result. The application of this transformation makes the data more consistent with the statistical inference of the study, and also improves the interpretability and appearance of the graph.

Data analysis is a crucial step in any research. Fundamentally, data analysis is the systematic process that adopts statistical testing and standardised procedures to interpret and evaluate the data. The main purpose of data analysis is to achieve research goals and support research conclusions. Therefore, the results of data analysis must accurately reflect the objectives of the study. A variety of quantitative methods are involved in the data analysis of the study. The data analysis used for statistical software is EViews.

Market Capitalisation Weighted Index is a stock market index with individual components weighted according to their market capitalisation. The capitalised weighted index is calculated by adding the total market capitalisation of all components and dividing by the arbitrary value determined when the

index appears. Market Capitalisation Weighted Index aims to measure the performance of financial markets. A study on REITs in the investment market by Osmadi (2010) had developed the M-REIT index by applying the market capitalisation weighted scheme. The REIT index will be developed from January 2010 until December 2017. All the total return indices are constructed every quarter and the market capitalisation weighted scheme is applied to construct the REIT index. The market value-weighted index is used to compute a new index for every group of data series. The formula below is used in the computing process:

$$\left\{\left(\frac{\sum MV_n R_n}{\sum MV_n}\right)1 \text{ x base value } _{t\text{-}1}\right.$$

Where:

$\sum$ = sum product
MVn = Market value for n number of asset
Rn = Return index for n number of asset

Unit root test is used as a method in the study to test the stationarity of a series before using it in a regression. If the series mean and auto co-variances do not depend on time it can be considered as stationary, conversely it is said to be non-stationary (Quantitative Micro Software 2010). The unit root test accounts for stationary of series tested, therefore in this study the Augmented Dickey-Fuller test (ADF) was applied (Dickey & Fuller, 1979).

Engle's ARCH test is a Lagrangian multiplier test that assesses the significance of the ARCH effect (Engle, 1982). The ARCH effect or volatility clustering is a condition where the variance changes over time, with low volatility and high volatility. The volatility clustering shows the temporal correlation and the change over time in REIT returns.

Volatility clustering or ARCH effects usually exist in the asset market (Lin & Fuerst, 2013). Therefore, in order to test the REIT fund's earnings volatility, the existence of volatility clustering or ARCH effects must first be tested. The LM test proposed by Engle (1982) is computed as follow:

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \varepsilon_t \quad (1)$$

$$\varepsilon^2 = \varphi + \varphi\varepsilon^2 + \ldots + \varphi\varepsilon^2 \; t\,0\,1\,t-2\,1\,t-p \quad (2)$$

R^2 represent REITs return (difference of the natural logarithms of the REITs index) and T is the sample size. The null hypothesis of LM test is that H_0: $\varphi 0 = 0$ and $\varphi_2 = 0$and$\varphi_3 = 0$... and $\varphi_p = 0$. If T R^2 exceeds the critical value of X^2, the null hypothesis of no ARCH effects is rejected. The series is considered to exhibit volatility clustering or ARCH effect, the period of high volatility will be followed by high volatility or vice versa.

ARCH is an econometric term used for observed time series. It has been widely used in financial time series analysis and can capture clusters and predict volatility. Engle (1982) developed the ARCH model to estimate the variance of British inflation. A regression model was introduced to simulate time-dependent variance. The ARCH model allows the conditional variance of the time series to change as a function of past squared error over time by applying an autoregressive structure on the conditional variance.

The ARCH model is calculated by using the following formula:

$$y_t = x_t y + \sigma^2_{\ t} + \varepsilon_t \quad (3)$$

Where: σ^2_t = one-period ahead forecast variance based on past information x = predetermined variables t = error

In this research, identifying the variance equations as well as estimation techniques and samples uses EViews software. The final analysis of the volatility joint movement must be done through systematic methods, such as analysing the volatility of M-REITs. The multivariate GARCH model helps capture the important relationship between macroeconomic determinants in Malaysia and REITs. The multivariate approach eliminates the two-step process, thereby avoiding the problems associated with estimating regression factors (Kourmous & Booth, 1995).

The GARCH model is estimated by computing the conditional leg-likelihood function:

$$\sigma^2=\alpha+\alpha\alpha^2+\beta\alpha^2 \quad t\,0\,1\,t-1\,1\,t-1 \tag{4}$$

Where:
t = number of observations
σ_t t = time varying conditional variance-covariance matrix

5. DISCUSSION AND FINDINGS

The correlation analysis is aimed to assess the relationship of macroeconomic factors within REIT investments in Malaysia. Table 2 shows the inter-correlation matrices between macroeconomic determinants and REIT returns in Malaysia from January 2010 to December 2017. There are six macroeconomic determinants in total, which are: base lending rate (BLR), money supply (MSUPPLY), industrial production (INDPRODUCT), exchange rate in Ringgit Malaysia per United States dollar (RM/USD), consumer price index (CPI) and gross domestic product (GDP).

Based on the result, the correlation value of all the variables is positive and high in value. The range of correlation between macroeconomic determinants and REITs is between r =0.5879 to r =0.9727. The highest correlation value is r =0.9727 which is contributed by MSUPPLY, followed by INDPRODUCT with r =0.9617, CPI with r =0.9615, GDP with r =0.9594, RM/USD with r =0.843, while the lowest correlation value is r =0.5879 which is contributed by BLR.

Overall, all macroeconomic factors show a high correlation to each other which indicates the strong relationship among macroeconomic factors. Thereafter the past eight years have seen each of the macroeconomic determinants highly relate to each other and could have high spill-over. The result is similar to Chatrath and Liang (1998) and Kola and Kodongo (2017) whereas the macroeconomic determinants are positively correlated to REIT returns. However, the result was in contrast with Abdullah and Hayworth (1993) and Soenen and Hennigar (1988) who found that interest rates and exchange rates have a negative relationship with REIT returns.

Table 2: Correlation Coefficient of Macroeconomic Determinants for REITs in Malaysia: January 2010 – December 2017

	REITs	BLR	MSUPPLY	INDPRODUCT	RM/USD	CPI	GDP
REITS							
BLR	0.59						
MSUPPLY	0.97	0.66					
INDPRODUCT	0.96	0.59	0.98				
RM/USD	0.84	0.35	0.86	0.87			
CPI	0.96	0.63	0.99	0.98	0.86		
GDP	0.96	0.67	0.97	0.99	0.82	0.99	

The ARCH model ADF unit root test is used to examine whether the variables are stationary or not. In general, there are three necessary conditions in applying unit root test, intercept, trend intercept and none. As the P-value is greater than 0.10 (P>0.10), the data series are not stationary or has unit root. This unit root test involves REITs, BLR, MSUPPLY, INDPRODUCT, RM/USD, GDP and CPI. The lag length is two maximum lags in the selection of Schwarz Info Criterion.

Table 3 shows the ADF unit root test results. The table shows that all variables are not stationary in the level stage except BLR has stationary in intercept condition and GDP has stationary in trend and intercept condition. However, after the first differencing on each variable, all the data is showing stationary at a 1% level of significant. This means that all the variables are stationary of order 1, which is I (1). From the table below, it shows all the data successfully achieved stationary after the first difference. Table 3 tabulates the t-statistics for all data series.

Table 3: Unit Root Test Analysis

Variable	ADF		
	None	Intercept	Trend and Intercept
T-Statistic Level			
REITs	2.2693	-0.0793	-3.4463
BLR	1.3984	-6.8566	-5.5830
MSUPPLY	5.6918	-0.5587	-4.1636
INDPRODUCT	4.2409	1.0013	-5.3986
RM/USD	0.7358	-0.4827	-2.4689
GDP	4.2869	-0.0817	-9.7953
CPI	5.7312	0.5256	-2.6056
T-Statistic 1st Level difference			
REITs	-4.8022	-5.7092	-5.5947
BLR	-6.0835	-5.9832	-6.0509
MSUPPLY	-1.3547	-6.0113	-5.8795
INDPRODUCT	-8.2323	-7.6553	-9.1548
RM/USD	-5.3369	-5.3984	-5.3798

GDP	-5.4343	-30.0183	-29.2573
CPI	-3.1994	-6.1039	-6.0863

unit root test at 1% level
unit root test at 5% level
unit root test at 10% level

ARCH LM test by Engle (1982) was undertaken to investigate the existence of volatility clustering in the macroeconomic determinants on REIT returns prior to employing an ARCH model. In order to employ the ARCH model, there are two conditions that need to be fulfilled, being volatility clustering and an ARCH effect. The results of LM tests for macroeconomic determinants on REIT returns are shown in Table 4.

Figure 1 shows the residual graph of ARCH LM test for volatility clustering of REIT returns which is the dependent variable while the macroeconomic determinants such as BLR, MSUPPLY, INDPRODUCT, RM/USD, GDP and CPI are independent variables. The findings depict that there is high volatility on REIT returns starting from Q1 year 2012 to Q1 year 2014 then continues with low and consistent volatility on REIT returns to the end of Q4 year 2017 for a prolonged period. The high volatility in the year of 2012 to 2014 is due to the peak in oil price crisis which caused uncertainty in Malaysia's economy. This means that there is volatility clustering in this model and fulfilled the first condition of the ARCH model.

Table 4 shows that all of the macroeconomic determinants have positive LM values at 1% of significance. This means that all of the macroeconomic determinants are significant and have an ARCH effect in the LM test. It had met the second condition of the ARCH model. Overall, all the macroeconomic determinants have clustering volatility and an ARCH effect. It has all the permission and validity to run the ARCH model. The results are consistent with the findings by Liow et al. (2011) which found the presence of ARCH effects in almost all real securities indexes.

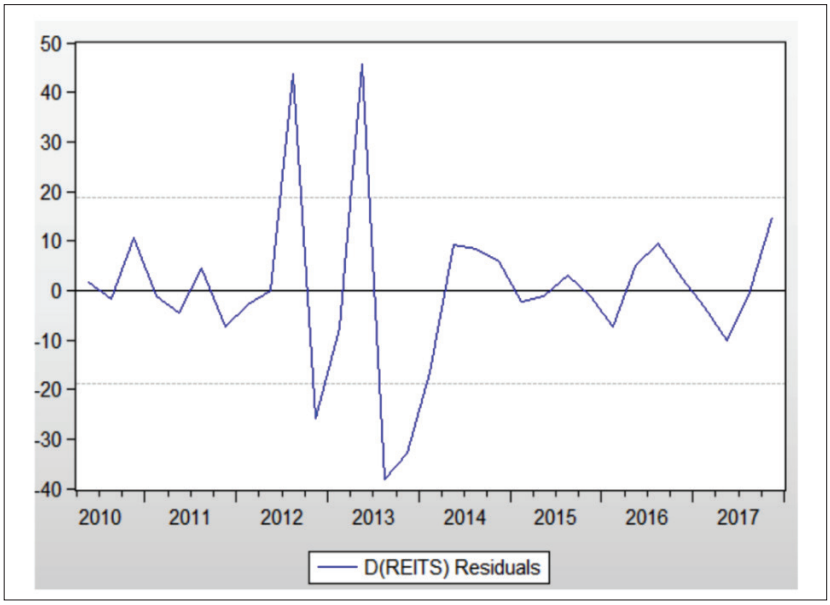

Figure 1: Residual graph of ARCH LM test for volatility clustering

Table 4: ARCH LM Tests for Volatility Clustering

Macroeconomic Determinants	LM (P-Value)
	REIT Return
BLR	215.6746 (0.0004)
MSUPPLY	954.4911 (0.0000)
INDPRODUCT	8.300025 (0.0000)
RM/USD	159.5192 (0.0000)
CPI	1747.099 (0.0000)
GDP	14.92676 (0.0000)

unit root test at 1% level
unit root test at 5% level
unit root test at 10% level

Understanding the volatility of the real estate market is particularly important, especially REITs, to assess investment and leverage, because volatility and investment risk are synonymous. Volatility is synonymous with risk and will provide a general overview of the country's economic activities. If the REIT market in Malaysia shows high volatility, investor participation may decrease. This may have an adverse effect on Malaysia's investment. Therefore, to investigate the volatility changes during the period from January 2010 to December 2017, the ARCH model will be used to develop the modeling of volatility changes. Once the REIT regression sequence is determined to have a volatility clustering and ARCH effect, the ARCH model is conducted along with macroeconomic determinants to test the volatility of the series. From the results of the ARCH LM test, all macroeconomic determinants are estimated in the ARCH and GARCH models. The results are shown in Tables 5 and 6.

In analysing the results, the significance of the variables (P-value) was determined from the Z score. The Z score is a measure of standard deviation. In the end, a two-tailed P-value (IZI>1) was adopted in this study. The null hypothesis is the volatility of dependent variables (REIT returns) is affected by independent variables (macroeconomic determinants). The findings from the analysis showed that MSUPPLY has the most macroeconomic significant determinants at the 1% level of significance to the REIT volatility. Moreover, GDP and CPI are at the 5% level of significance to the REIT volatility. In addition, REIT volatility is affected by the changes of BLR at the 10% level of significance. Therefore, from the ARCH analysis perspective, the macroeconomic determinants of REIT return volatility are MSUPPLY, GDP, CPI and BLR. Table 5 tabulates the findings from the ARCH model for all macroeconomic determinants.

The volatility analysis further continues to use the GARCH technique to test the significance of macroeconomic determinants on the volatility of M-REITs. Table 6 shows the results of the GARCH model for REIT return volatility. The results suggest the conditional mean coefficients for all macroeconomic determinants were significant over this period with P-value equal to 0, with the exception of RM/USD. Based on the minimum AIC/SIC values and maximum log-likelihood values, it can be concluded that the GARCH model best captures volatility dynamics of the macroeconomic determinants on REIT return volatility. In addition, the coefficients in the ARCH model are negative. The results of the study indicate that GARCH is the better model than ARCH over the period. GARCH succeeded in simulating the volatility during the period for BLR, MSUPPLY, INDPRODUCT, GDP and CPI with statistically significant coefficients. The results correspond with the findings by Liow (2008) which found some volatility persistence in Asian property securitised markets. The strong presence

of the GARCH effect has also been found in the analysis of Asian REITs by Pham (2012) which reflects the whole property market.

Table 5: ARCH Model Results

Macroeconomic Determinants	ARCH
	REITs
Mean equation	
Equation	-11061/34
	(-3.9444)
BLR	-63.8627
	(-1.9119)
MSUPPLY	1309.873
	(3.7189)
INDPRODUCT	-1.0348
	(-0.3740)
RM/USD	-2.9572
	(-0.1364)
GDP	1297.627
	(2.2665)
CPI	-12.6358
	(-2.0444)
Variance equation	
Constant	406/5287
	(2.5673)
ARCH	-0.1059
	(-0.2136)
AIC/SIC	9.28/9.70
Log Likelihood	-139.6155

unit root test at 1% level
unit root test at 5% level
unit root test at 10% level
P-value = 0.00

Table 6: GARCH (1,1) Model Results

Macroeconomic Determinants	ARCH
	REITs
Mean equation	
Constant	-11822.67
	(-6740.770)
BLR	-65.95120
	(-4.6732)
MSUPPLY	1198.891
	(521.9759)
INDPRODUCT	-5.6579
	(9.1080)
RM/USD	4.9075
	(0.3055)
GDP	1508.865
	(990.4822)
CPI	-6.4326
	(-6.2382)
Variance equation	
Constant	0.3677
	(0.1347)
GARCH (1)	0.0455
	(0.4605)
AIC/SIC	8.98/9.44
Log Likelihood	-133.7384

unit root test at 1% level
unit root test at 5% level
unit root test at 10% level
P-value = 0.00

Based on the findings, the difference between the significant determinants to REIT returns from correlation analysis and its volatility from ARCH and GARCH models were identified. The findings indicate that all of the macroeconomic determinants are significant to REIT returns while there are five for REIT return volatility. The significant determinants for REIT returns are: BLR, MSUPPLY, INDPRODUCT, RM/USD, GDP and CPI, while in the case of REIT return volatility, RM/USD is not included as the determinant. This explains that shocks in BLR, MSUPPLY, INDPRODUCT, GDP and CPI will produce dynamic responses in the M-REIT market. Table 7 summarises the macroeconomic factors that are significant to the REIT returns and volatilities.

The results of ARCH and GARCH test examined that there is significance of macroeconomic determinants on REIT return volatility in Malaysia. The findings from the analysis showed that MSUPPLY has the most macroeconomic significant determinants at the 1% level of significance

to the REIT volatility. The results of the study indicate that GARCH is a better model than ARCH over the period. GARCH succeeded in simulating the volatility during the period for BLR, MSUPPLY, INDPRODUCT, GDP and CPI with statistically significant coefficients.

Table 7: Macroeconomic determinants for REIT returns and volatility

REIT Returns	REIT Volatility
Base lending rate	Base lending rate
Money supply	Money supply
Industrial production	Industrial production
Exchange rate	GDP
GDP	CPI
CPI	

6. PROPERTY IMPLICATIONS

This study aims to examine the macroeconomic determinants on REIT returns from January 2010 to December 2017. From the output, it is observed that content analysis shows there are six common macroeconomic determinants on REIT returns which are: Interest Rate, MSUPPLY, INDPRODUCT, RM/USD, GDP and CPI. These macroeconomic determinants were then analysed together with the quarterly REIT returns to find the most significant macroeconomic determinants on REIT returns in Malaysia. From the output, it is observed that all the macroeconomic determinants are exposed to the same correlation status. All of the macroeconomic determinants show a positive linear relationship to the REIT returns. The range of correlation between macroeconomic determinants and REITs are between r =0.5879 to r =0.9727. It indicates a strong relationship between macroeconomic determinants and REIT returns in Malaysia, as the increase of macroeconomic determinants represents the increase of REIT returns. In order to conclude the findings in general terms, the increase of macroeconomic determinants will lead to a rise on REIT returns.

Based on the results, all of the macroeconomic determinants have volatility clustering and the ARCH effect by using the ARCH LM test. From the result of the ARCH analysis, it can be noted that only MSUPPLY, GDP, CPI and BLR are significant and volatile. The analysis on volatility further continues by using the GARCH technique to examine the significance of macroeconomic determinants on REIT returns of volatility in Malaysia. The findings suggest that GARCH is performing better than the ARCH model over the period. All of the macroeconomic determinants are significant to the REIT return volatility, with the exception of RM/USD.

7. CONCLUSIONS

This paper provides insight to the REIT return volatility in Malaysia based on the macroeconomic determinants such as BLR, MSUPPLY, GDP, CPI, INDPRODUCT and RM/USD which has a significant growth in the M-REIT market. The result of the content analysis from a previous study found that the inflation rate is the most used determinant on REITs followed by interest rates, MSUPPLY, currency exchange rate, GDP, INDPRODUCT, population and lastly employment rate. Policymakers can identify macroeconomic determinants that are significant to REIT returns and make decisions on the rate, such as interest rates and inflation rates, which will determine the REIT return volatility. Speculation and herd behaviour in the REIT return volatility will be decreased as this study is directly analysed with macroeconomic risk in Malaysia.

This study does provide some implications, especially to the investors and fund managers. Fundamentally, this study managed to provide information about the issue of relationships and the significance of the macroeconomic determinants and REITs by using correlation analysis, ARCH and GARCH models. The findings can reflect the REIT return movement in response to macroeconomic determinant trends. Through the correlation analysis, it provides information to investors to enable a better understanding of the current REIT market related to macroeconomic determinants. Therefore, in an uncertain economic situation, investors can better distribute wealth through the proposed REITs and diversify their portfolios.

The findings of this study show that there are volatility clustering in all of the determinants on REIT returns in Malaysia. This indicates that the REIT market is exposed to unsystematic risk and uncertainty especially during Q1 year 2012 to Q1 year 2014 when Malaysia experienced the peak of the oil price crisis. The identification of volatility clustering in the macroeconomic determinants in Malaysia will increase the awareness of investors and policymakers toward the importance of REIT return volatility. Furthermore, the results from the GARCH model show that five determinants have an impact on to REIT return volatility in Malaysia. This study provides information of the level of significance of determinants to the REIT return volatility. This will contribute to decision-making for portfolio investment and diversification. Fund managers can take into consideration the specific determinants which will impact REIT returns before making investment decisions to minimise the risk. Policymakers can also consider these determinants in making their REIT's policy.

In summary, the results of this study have increased investor awareness of investment allocation strategies related to the macroeconomic movement. Therefore, they can redefine their investment strategy and make wise decisions based on the information provided in this study. In addition, this study may be beneficial to academicians or researchers, especially REITs applied in the macroeconomy.

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UNDERSTANDING USER'S PERSPECTIVE ON COWORKING SPACE: CASE OF KUALA LUMPUR

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ABSTRACT

Working from anywhere at any time has become possible due to changes in attitudes about work and the greater use of mobile technologies over the past few decades. However, employees continue to look for work settings that encourage networking and collaboration opportunities. Coworking spaces are becoming more and more popular as a result of this. The exact preferences of coworking space users, however, are not well understood. The purpose of this study is to examine user perceptions of coworking spaces. 200 respondents from coworking spaces in Kuala Lumpur completed a questionnaire to provide the stated choice information. The user preferences were examined using a multinomial logit model. The findings indicate that coworkers' primary reasons for choosing to work in a coworking setting were to find a location of employment other than their homes where they could do so in a stimulating environment. The most crucial factors to consider while selecting a particular coworking place are accessibility and atmosphere/interior. These findings give coworking space owners and managers strong insights into how to accommodate coworker preferences by providing coworking spaces with decent vehicle and public transportation a semi-open layout, and a homely decoration.

Keyword: *Coworking space, Kuala Lumpur, perspective, multinomial logit model.*

1. INTRODUCTION

Coworking spaces have become a brand-new and exciting phenomenon in business during the past ten years. Coworking is increasingly significant to theory, practise, and policy in entrepreneurship due to its prevalence, popularity, and potential for disruptive change: nevertheless, given the quick emergence of the phenomena, its consequences are mostly unstudied. Overall, additional study is required to inform owners, decision-makers, and business people about the impacts of this new organisational style.

Past study by Bueno (2018) is related to analyzing the main factors for increasing productivity in coworking spaces. However, there hasn't been much research done in this area, and none that has particularly examined coworking spaces has been found. This study extended a research model based on earlier literature and demonstrated the impact of the coworking environment and social interactions on productivity in this type of workplace. The results offer valuable information for elucidating the most important reasons why a group of people, primarily freelancers, with more or less diverse backgrounds, prefer to co-locate themselves in the same working environment. Overall, based on the opportunities provided by some of the core features of the spaces, like social interactions, new opportunities, and knowledge sharing, the analysis conclusively shows that coworking spaces are suitable places to engage in collaborative activities to produce highly productive work.

In Malaysia, the office market has grown dramatically in tandem with the nation's economic expansion. This has made it easier for both domestic and foreign investors to set up business in major cities like Johor, Penang, and Kuala Lumpur. In recent years, Kuala Lumpur, the capital of Malaysia, has experienced a boom in the office sector due to an increase in the supply of office space. The cost of office space in KL remains prohibitive despite the rise in supply, particularly for start-ups and smaller businesses. The conventional approach to office setup typically entails lengthy lease terms and expensive fit-outs or renovations that must be completed before the business operation can start. So as a less expensive option to their office, coworking space could ease their load. Since operators often occupy at least one floor of an office building, the coworking space business model is thought to help with the problem of oversupply of office space. (Tan, 2019). The number of coworking space in Kuala Lumpur has increased drastically by time (Yeo, 2021). The exact demands of coworking space customers in Kuala Lumpur, however, are not well understood. The characteristics of coworking spaces for users in Kuala Lumpur itself have not yet been studied. Therefore, the purpose of this study is to comprehend the user's perspective of the Kuala Lumpur coworking space.

2. LITERATURE REVIEW

2.1 Coworking Space

More than any other type of space, coworking spaces have developed rapidly in the past five years. Since originating in San Francisco in 2005, they have grown at rates as high as 250 percent annually, and 1,200 coworking spaces now exist in Europe and 3,000 at a global level (Deskmag, 2014). In turn, approximately 160,000 employees functioned in coworking spaces in 2014, and more than one million people will do so by 2018 (Marzloff, 2013). Despite the lack of any accepted academic definition of coworking, it implies a new form of work organization that enables collaboration opportunities and encourages a sense of community inside a shared space, gathering together workers from different companies or even freelancers with different profiles and objectives (Johns and Gratton, 2013). This new type of work organization has led to a transformation of not only working spaces but also the way people work and collaborate. These new spaces, which workers co-create themselves to reflect the high value they place on autonomy and empowerment, have started disrupting classic models of work organization.

People from a variety of professional backgrounds, such as freelancers. entrepreneurs, startups, and small businesses can use coworking spaces, which are various types of contemporary open workspaces that offer shared office amenities and infrastructures (Bouncken & Reuschl, 2018). These areas frequently adhere to custom-made or upscale interior design principles (WatersLynch & Duff, 2019). Most coworking spaces run by service providers are accessible to all businesses and professions. Independent coworking spaces strive to improve flexibility, and networking. Cooperation, and creativity in addition to offering shared office facilities (Clayton et al., 2018). Additionally, businesses like Google, SAP, and consulting firms have adopted this trend and manage their coworking spaces to improve project coordination and widen their innovation pipeline (Bouncken & Reuschl, 2018). People from other professions who are not in the same firm may use some of the corporate's coworking space. For example, freelancers are able to collaborate in the same coworking space with the employees of Maxis Berhad in WeWork.

Workers now have more options for where, when, and how they work allowing them to be more independent in both their professional and personal lives because to the quick speed of technical innovation in digitization (Green, 2014) The use of information and communication technology to complete work virtually has become a reality (Kubatova, 2014). This led to the emergence of the "creative economy, which describes a more imaginative approach to knowledge-based jobs that may support the expansion of start-ups and independent contractors. These two sorts of workers adopt a new way of working where they plan their own work schedules rather than being restricted to the traditional working hours (Waber et al., 2014). Additionally, knowledge professionals can now work through portable laptops while benefiting from ubiquitous access to information (Moriset, 2014). However, Spinuzzi (2012) mentioned that there are drawbacks of working alone. They discover that they are no longer interested in making connections and establishing trust in their interactions with others. This pertains to the problems of segregation, loneliness, difficulty to form relationships, and the potential erosion of boundaries as people fight to keep personal lives and work separate (Spinuzzi, 2012). Therefore, the growth of coworking spaces, which fall somewhere between telecommuting and working in an actual office setting, acts as a safeguard against these problems.

The idea of coworking spaces is becoming more and more common in the Asia Pacific area as a result of changes in corporate cultures and organisational structures. In 2019, the region alone accounted for more than 35% of all coworking spaces globally (Moore, 2020). This exemplified how a growing number of workers from the particular are drawn to shared workplaces due to their more flexible work patterns, as well as the chance to be socially and geographically close to other professionals (Gerdenitsch et al., 2016). Coworking is a relatively new idea, although having a lot of potential. The number of coworking spaces worldwide has increased significantly in recent years despite being mostly unknown of ten years ago. According to projections, there will be some 41,975 coworking spaces worldwide by the end of 2024, refer to Figure 1. Investors have taken note as a growing number of entrepreneurs move into these spaces. Since they have been among the "Few bright spots in the office-market during the economic recovery" making them "one of the few sources of demand, many of the major landlords in the world are spending extensively in these spaces. Numerous sources have analysed the latest developments in coworking and what they might mean for entrepreneurship and the future of work as coworking has grown in popularity. The majority of individuals think that the growth of coworking is one of the most ubiquitous trends in recent entrepreneurial activity (Kreamer, 2012).

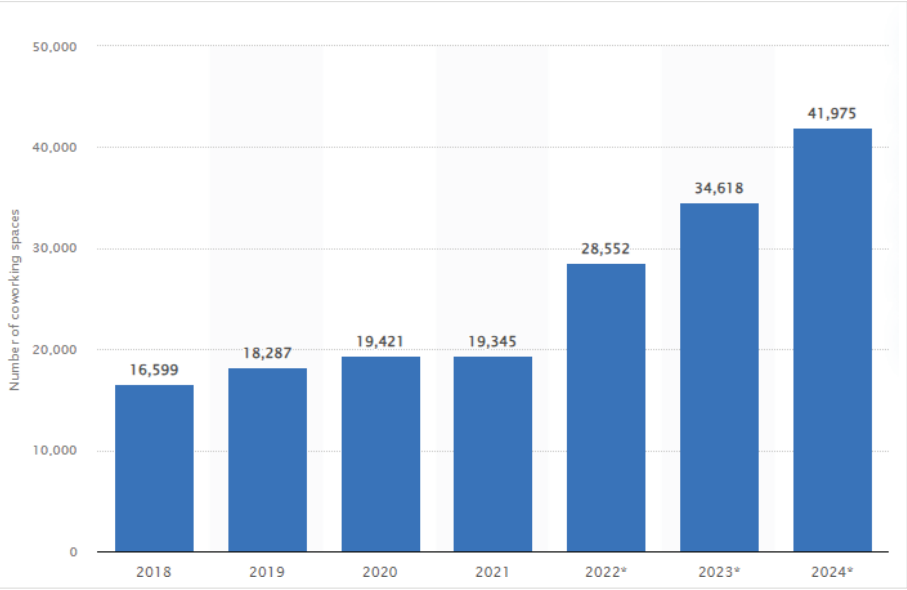

Figure 1: Number of coworking spaces worldwide 2018-2024

2.2 Coworking Space in Urban Malaysia

In Malaysia, the office market sector has grown at a remarkable rate in tandem with the economic development activities in the country. This has caused a favourable business environment for both domestic and international investors to set up their operations in urban cities such as Kuala Lumpur, Penang and Johor. Focusing on the study in Kuala Lumpur (henceforth known as KL), this capital city of Malaysia is divided into a few major central business districts (CBDs) around the area of KL city center (KLCC, Bukit Bintang) and KL fringe (Bangsar, Mid Valley, Sunway Velocity, Bangsar South, KL Sentral). In recent years, the

office market within KL has expanded with growing supply with a fluctuating number based on the market condition at the time as reported by Savills (2019). Currently, the total office space supply stood at 126 million square feet. However, despite the growth of office supply, the office rental rate has stayed relatively consistent at an average gross rent of US 1.40 per square feet for office buildings with good specifications (Savills, 2019). Although the KL's office rental is one of the most affordable in the region, the rental rate is still relatively unaffordable especially for smaller-sized companies such as start-ups. Thus, co-working space could help to alleviate their burden as a cheaper option for their office.

The strong support from local government initiatives such as Malaysia Global Innovation and Creativity Centre and Malaysia Venture Capital Management, which are established to support local budding start-ups (Lee, 2014), has successfully led to the rapid growth of co-working space operators in urban Malaysia. With the current co-working pie in Malaysia shared by 31 operators as identified by JLL (2017), this number is continuously growing with both new international and local players entering the market. With more than 60% of co-working spaces located outside KL city centre, the undeniable precondition the co-working space looks at is a location with access to transportation and easy accessibility to shopping malls.

Although it has been widely accepted in Western nations since the early 2000s, the coworking space concept didn't begin to gain atttraction in Malaysia until 2010 (Cho, Ibrahim & Zubir, 2020). According to Knight Frank Malaysia, a real estate consultancy firm, there are now 160 coworking spaces spread across 66 coworking operators in Kuala Lumpur, increasing fourfold from 2017 to 2020 (Yeo, 2021). Then, in 2020, the Covid-19 epidemic occurred, prompting a redesign of the workplace and accelerating the movement. Due to their desire to work in a community-based environment, Malaysians are embracing a hybrid work culture. The chance to "right- size" their workspaces has been seized by businesses, and they are now looking for more adaptable, economical, and plug-and-play choices. To compete with other coworking operators and capitalise on the new market trends that the epidemic had created, coworking operators must enhance their services and product quality particularly as demand from clients rises.

There are recent years publication from researcher in Asia which are summarised in Table 1; in Malaysia carried out by Kenanga (2018), "The rise of coworking spaces in Malaysia" to study about core factors of increasing popularity of coworking spaces; Malaysia by Aliff Yusri (2018) "Room To Grow: Coworking Spaces And SMEs" to explore about current economics of coworking spaces; Malaysia by Lim (2018) "Curating Coworking Space as A Third Place" to study the concept and possibility of coworking space for interaction; Singapore by Tie (2018) "Coworking Space" to study about facts in Singapore on the growth of coworking spaces; China by Zhai (2017) "A study of the coworking operating model" to explore on optimal types of operating coworking spaces.

Table 1: Recent Years Publication From Researcher In Asia

Title	Year of Publication	Author	Context	Description of Study
The rise of coworking spaces in Malaysia	2018	Kenanga	Malaysia	Core factors of increasing popularity of coworking spaces
Room to grow: Co-working spaces and SMEs	2018	Aliff Yusri	Malaysia	Current economic of coworking spaces
Curating coworking space as a third place	2018	Lim	Malaysia	Concept and the possibility of coworking spaces for interaction
Coworking spaces	2018	Tie	Singapore	Factors in Singapore on the growth of coworking spaces
A study of the coworking operating model	2017	Zhai	China	Optimal types of operating coworking spece

(Source: Author, 2023)

2.3 Coworking Space Characteristics and User Preference

Kojo and Nenonen (2016) based on the business model and level of user access, identified six types of coworking spaces: public offices (ie., free coworking spaces, like libraries); third places (i.e., public spaces that demand payment for services, like cafés); collaboration hubs (ie., public offices that emphasise worker collaboration); coworking hotels (i.e., shared office space with a brief lease contract and a minimal service package); and incubators (i.e., shared off-site workspace). Only those who used coworking hotels and shared studios were included in this study; public areas like libraries, cooperation hubs, or third places are not. The primary objective of these public areas is not to offer coworkers offices, and there is no rental agreement. These public offices are not considered in this study because its goal is to aid coworking space providers in strengthening their competitive position. Additionally, incubators are not taken into account in this study because they are a particularly specific kind of multi-tenant office that are primarily supported by public funding and are designed to assist start-up businesses. (Weijs-Perrée et al., 2016). Although there are several types of coworking spaces, they share the same core values, namely: collaboration, community, accessibility, sustainability and (Kwiatkowski & Buczynski, 2011). Collaboration refers to working together with other co-workers.

Additionally, because to the open setting of a coworking space, participants regularly engage in spontaneous encounters with one another (Gerdenitsch, Scheel, Andorfer, & Korunka, 2016), it is occasionally necessary to assign a coworking host to foster collaboration, networking, and engagement among coworkers (Fuzi, 2015). Furthermore, some coworking spaces foster a sense of community where users can develop professionally with the assistance of other users (Sykes, 2014). Its greatest asset is that the community is welcoming and accessible to everyone. Coworkers can locate other individuals, ideas and resources in this network, exchange experiences, grow from one another and recognize each other's' achievements (Waters-Lynch & Potts, 2017). Additionally, a number of coworking space companies supply space at various places. Independent professionals thus have the freedom to pick their place of work. Coworking spaces are also widely available because office space is frequently provided for inexpensive rental rates and flexible leasing agreements. They have a rental duration of one day, one week, or one month (Sykes, 2014). A common coworking environment mixes features of a workstation (functional spaces) with leisure and artistic spaces (Rus & Orel, 2015). A co-working space's traditional physical layout features an open floor plan with communal workplaces where employees can readily engage with one another. Compared to conventional multi-tenant offices, this one provides more informal places and amenities including coffee shops, kitchens, meeting 24/7 to the internet, printers, copy machines, lounge areas, and other such areas (Sykes, 2014). The characteristics of typical coworking spaces listed in earlier studies are shown in the table 2. Important common coworking space attributes are based on these traits, which are then studied to determine user preferences for them.

Table 2: An overview of the coworking space qualities cited in the literature

	Leforestier 2009	Deijl 2011	Deskmag 2012	Spinuzzi 2012	Deskmag 2013	Fuzi et al 2014	Kojo and Nenonen 2014	Sykes 2014	Fuzi 2015	Gandini 2015	Parrino 2015	Tan and Lau 2021	Bouncken & Reuschl 2016
Physical Attributes													
Atmosphere and interior aesthetics		*			*	*	*		*	*	*	*	
Collaborative spaces	*					*	*	*				*	*
Concentration rooms			*	*		*							*
Event spaces	*						*					*	*
Shared workspaces	*					*	*		*			*	*
Pantry		*					*	*					*
Meeting rooms							*	*				*	
Open space layout							*	*					
Convenience location			*	*	*							*	
Services Attributes													
Access to tools and resources		*	*		*	*	*		*			*	
Co-working host24-hr access	*			*			*	*	*	*		*	
Diversity of tenants					*	*						*	
Networking events and workshops		*			*		*		*		*	*	*
Virtual platform						*	*				*		
Sense of community				*	*				*			*	*
Collaboration opportunities				*								*	
Information and knowledge sharing				*								*	
Leasing attributes													
Lease flexibility		*	*	*	*	*	*	*	*			*	

Sources: Developed for the resear

Studies that focus on people who use coworking spaces are typically more open-ended and focus on understanding the factors that motivate people to choose coworking spaces as their work environment (Table 3). For example, Deskmag (2012) found that rental expenses are cited by most respondents as the main justification for coworking. In addition, Capdevila (2013) stated that location is one of the main factors in deciding to join. Coworkers were motivated by feeling like they belonged to a community and being in an exciting workspace (Fuzi, 2015). Research on users' preferences for coworking space features is relatively scarce, nevertheless. One of the research projects on the characteristics of multi-tenant workplaces in general focused on user satisfaction, which is related to user preferences (Hartog, Weijs-Perrée, & Appel-Meulenbroek, 2017). Results showed that users of multi-tenant workplaces are most satisfied with the accessibility and availability of fixed workspaces and least satisfied with their ability to adjust to the indoor climate. Previous studies also demonstrated how user preferences are influenced by individual attributes in addition to the features of coworking spaces. For example, Rothe, Lindholm, Hyvönen, and Nenonen (2011) showed that the preferences of single tenants in office spaces are influenced by individual characteristics in a variety of ways. They demonstrated, for instance, that younger employees prefer a work environment that fosters teamwork, but older employees prefer having personal control over the indoor climate. Additionally, they demonstrated that respondents who spent all their working hours at the office placed the greatest value on the workplace environment's capacity to uphold the image and values of the company for which they were employed (Rothe et al., 2011). Furthermore, Remøy and Van der Voordt (2013) showed that user preferences are influenced by the organization's sector. For instance, they demonstrated that employees working in the creative industries prefer a flexible arrangement with shared spaces, conference rooms, and an interior that represents their company.

Table 3: An Overview of The Research on Coworking Space Motivations

	Capdevila 2015	Capdevila 2013	Deijil 2011	Deskmag 2012	Deskmag 2013	Fuzi 2015	Fuzi 2014	Gandini 2015	Kojo & Nenonen 2014	Leforestier 2015	Markel 2015	Moriset 2015	Sykes 2014
Access to a network of co-workers	*	*				*	*				*		
Affordable accommodation		*	*		*	*	*	*	*	*	*		*
Collabration with co-workes		*	*		*	*	*	*	*	*	*	*	*
Feeling part of a community	*	*	*	*	*	*	*		*	*	*	*	*
Interaction and social support	*		*	*	*	*	*			*	*	*	*
Proffesional support from co-wokers	*		*	*	*	*				*	*		*
Sharing ideas and knowledge	*	*	*		*	*	*		*	*	*	*	*
Inspiring and Creative atmosphere			*		*	*	*		*		*	*	

Source: Development for the research

3. METHODS

This study was conducted in several coworking spaces located within Kuala Lumpur and the sampling method of this research was based on a purposive basis. In this study, 200 users participated in the survey. Respondents were asked to choose between two given hypothetical or alternatives of coworkspaces and a non-option. Each respondent will be presented with nine choice sets of two alternatives and an answer option for 'none of the alternatives suffice'. Each alternative has its own type of attributes that the respondents can choose from. In order to create the alternatives of workspaces, seven attributes have been identified with each attribute contains three attribute levels as in Table 4 and Table 5. In the end, nine chosen sets were assembled from the eighteen alternativess co-workspaces. These nine choice sets were offered to the respondents. The list of the alternatives is as shown in Table 4.

Table 4: Alternatives Coworking Space

No	Accessibility	Environment andinterior artistic	Layout space	Reception and hospitality	Events	Type of lease contracts	Variety in spaces
1	Public Transport	Homelike	Open Layout	No Reception	Sometimes	Short Term	Standard
2	Car and Public Transport	Industrial	Open Layout	No Reception	No Events	No Contract	Basic
3	Public Transport	Modern	Open Layout	Reception and Host	No Events	No Contract	Premium
4	Car	Industrial	Open Layout	Reception and Host	Often	Short Term	Premium
5	Public Transport	Industrial	Semi-Open Layout	Reception But No Host	Often	No Contract	Standard
6	Car and Public Transport	Homelike	Semi-Open Layout	Reception But No Host	No Events	Short Term	Basic
7	Car	Homelike	Open Layout	Reception and Host	Often	Long Term	Basic
8	Public Transport	Modern	Semi-Open Layout	No Reception	Often	Long Term	Basic
9	Car and Public Transport	Industrial	Semi-Open Layout	Reception and Host	Sometimes	Long Term	Premium
10	Car and Public	Modern	Closed Layout	No Reception	Often	Short Term	Premium
11	Transport Public Transport	Homelike	Closed Layout	Reception But No Host	No Events	Long Term	Premium
12	Car	Industrial	Closed Layout	No Reception	No Events	Long Term	Standard
13	Car and Public Transport	Homelike	Closed Layout	Reception and Host	Often	No Contract	Standard
14	Public Transport	Industrial	Closed Layout	Reception and Host	Sometimes	Short Term	Basic
15	Car	Modern	Closed Layout	Reception But No Host	Sometimes	No Contract	Basic
16	Car and Public	Modern	Open Layout	Reception But No Host	Sometimes	Long Term	Standard
17	Transport Car	Modern	Semi-Open Layout	Reception and Host	No Events	Short Term	Standard
18	Car	Homelike	Semi-Open Layout	No Reception	Sometimes	No Contract	Premium

Table 5: Attributes Level

Attributes	Attributes Level
Accessibility	Car and public transport Car Public transport
Environment and interior artistic	Industrial Modern Homelike
Layout space	Open layout Semi-open layout Closed layout
Variety in spaces	Basic Standard Premium
Reception and hospitality	No reception Reception but no host Reception and host
Events	No events Sometimes Often
Type of lease contract	No contract Short term Long term

The questionnaire is used in this study to collect information about the respondents' experiences and observations. As part of the questionnaire survey, online surveys were distributed to the users of the coworking space. The online surveys were distributed from 11th April until 26th May 2023. The online surveys were accessible through a QR code and link that leads straight to the survey online. The QR code and link of the online survey are shared among the coworking space users in Kuala Lumpur by email blasts and approaching the users of coworking space themselves. The survey questionnaire were analysed using Multinomial Logit Model (MNL) to study the overall workspace preferences. A coding scheme will be utilized because this calls for highly specialized coding. To calculate the utility weights of each attribute level, this is necessary. The following equation can be used to determine an alternative's utility (Hensher, Rose, & Greene, 2015b):

$$Uiq = Viq + \varepsilon iq = \sum \beta n Xinq\ n + \varepsilon iq$$

Uiq = The overall utility of individual q for alternative I;
Viq = The structural utility of individual q for alternative i:
εiq = The error-component (random utility component);
βn = The utility weight for attribute n;
$Xinq$ = The score for alternative i on attribute n for individual q.

The error component εiq is added to be able to account for example measurement errors (Kerkman, 2020).

It is necessary to execute or calculate several goodness-of-fit measurements to determine whether the analysis provides valid conclusions. Conclusions from the findings of this study may only be made once they demonstrate that the models functioned adequately. The measures that can be used are the log-likelihood of the estimated model (LL(B)) and the rho-square adjusted (p2 adj) (Kemperman & Timmermans, 2008). The log-likelihood can be calculated with the following formula (Train, 2009):

$LL\ (\beta) = \sum \sum yqi\ In(pqi)\ N\ q = 1$

$LL\ (\beta)$ = log likelihood function at estimated parameters;

N = sample size

yqi = choice of person q for alternative i.

With the use of the other measures can be calculated. First of all the rho- square (p2) (Train, 2009):

$P\ 2 = 1 - LL(\beta) / LL\ (0)$

The rho-square has a value between 0 and 1. The higher the value the better the model. Models with a value between 0,2 and 0.4 are considered good, and models above 0.1 are usable (Kerkman, 2010). The rho-square however does not take the number of parameters into account. In order to do this, the rho-square adjusted (p2 adj) needs to be calculated (Nijënstein, 2012).

$padj\ 2 = 1 - LL(\beta) - p / LL\ (0)$

P = number of estimated parameters

4. Results and Discussion

The respondents were given the option of two fictitious workspaces and a non-option. With the help of this information and the Multinomial Logit Model, judgments regarding preferred workspaces can be drawn. The results of the Multinomial Logit Model are as in Table 6 below:

Table 6: Result of Multinomial Logit

Attributes	Levels	Coefficient (β)
Constant		1.376***
Accessibility	Car and public transport	0.688***
	Car	-0.930***
	Public transport	0.242***
Environment and interior artistic	Industrial	-0.172***
	Modern	-0.313**
	Home-like	0.485**
Layout space	Open layout	0.056***
	Semi-open layout	0.333***
	Closed layout	-0.389***

Attributes	Levels	Coefficient (β)
Variety in spaces	Basic	-0.072***
	Standard	0.124***
	Premium	-0.052***
Reception and hospitality	No reception	-0.206***
	Reception but no host	0.169***
	Reception and host	0.037***
Events	No events	-0.170***
	Sometimes	0.159***
Type of lease contracts	Often	0.011***
	No Contract	0.365***
	Short Term	-0.042***
	Long Term	-0.323***

*Significance with p≤0.05** significance with p≤0.01
Note: Attribute level 3 is calculated, and has no significance level

The significance of the attribute level is summarized as in Table 7 below:

Table 7: Summary of model based on significance.

Model co-workspace attribute

Attributes	Levels	
Accessibility	Car and public transport	
	Car	
	Public Transport	
Environment and interior artistic	Industrial	
	Modern	
	Home-like	
Layout space	Open layout	
	Semi-open layout	
	Closed layout	
Variety in spaces	Basic	
	Standard	
	Premium	
Reception and hospitality	No reception	
	Reception but no host	
	Reception and host	

Events	No events	
	Sometimes	
	Often	
Type of lease contracts	No contract	
	Short term	
	Long term	

Legend	
	Positive significance
	Positive without significance
	Negative significance
	Negative without significance
Third Level	

The goodness of fit is summarized as in the Table 8 below:

Table 8: Goodness of fit

Goodness of fit	
Log-likelihood function (LL(β)	*-2133.186*
Restricted log-likelihood function (LL(0))	*-2782.423*
ρ*2*	*0.2333*
ρ*2 adjusted*	*0.2218*

The effectiveness of a model can be assessed by examining its log-likelihood and rho-square values, which help decide whether the results can be used to draw inferences. As stated, models are considered good when the rh0-square (p2) is between 0.2 and 0.4 and are still usable if this value is between 0.1 and 0.2. Since the rho-square and rho-square adjusted are 0.2333 and 0.2218 respectively, the model is considered good to be used and the results can be used to make conclusions.

4.1 Utility of attributes

Higher preferences are demonstrated by a higher utility. Higher preferences are evident and demonstrate the attributes level that significantly influence the preference for the workspace as a whole.

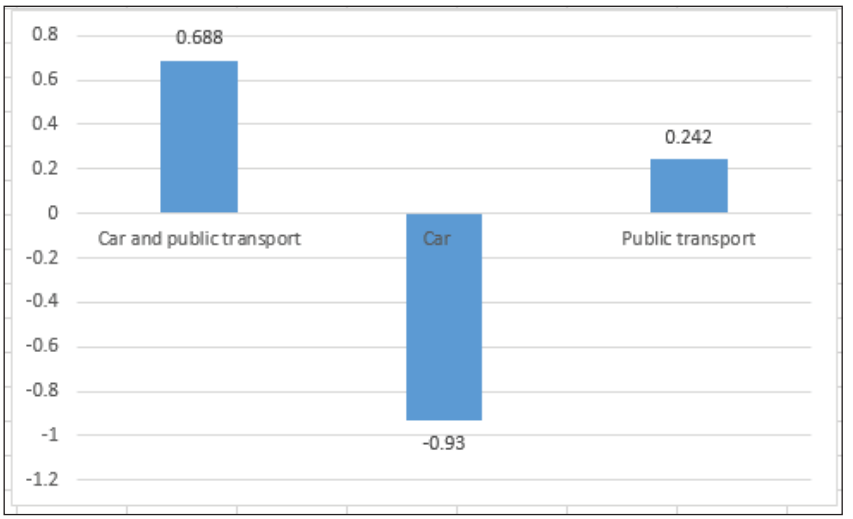

Figure 2: Utility of Accessibility

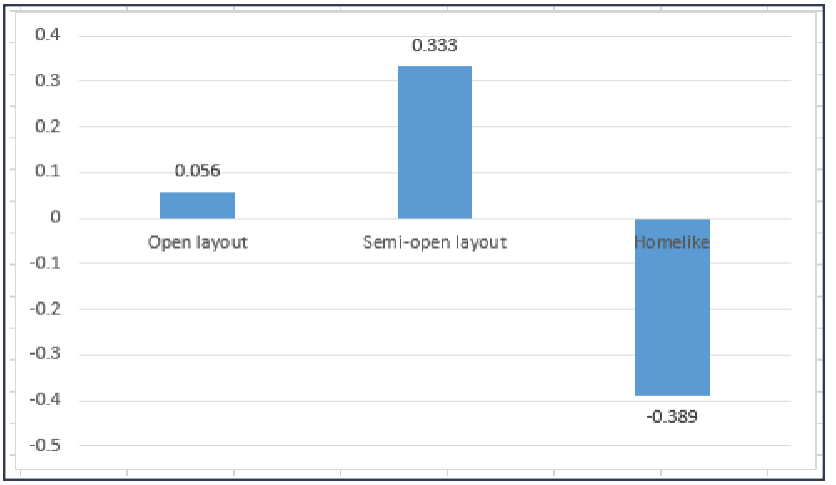

Figure 3: Utility of environment and interior artistic

As shown in Figure 1, the accessibility of the coworking space by car and public transport has the highest utility which indicates the highest preference. This shows that the car and public transport is more preferred than having accessibility by only just car and public transport. While, Figure 2 shows the environment and interior artistic of homelike have the highest utility (0.485) compared to industrial and modern which indicates that homelike features are the most preferred. The modern type is the least preferable, having the least amount of utility.

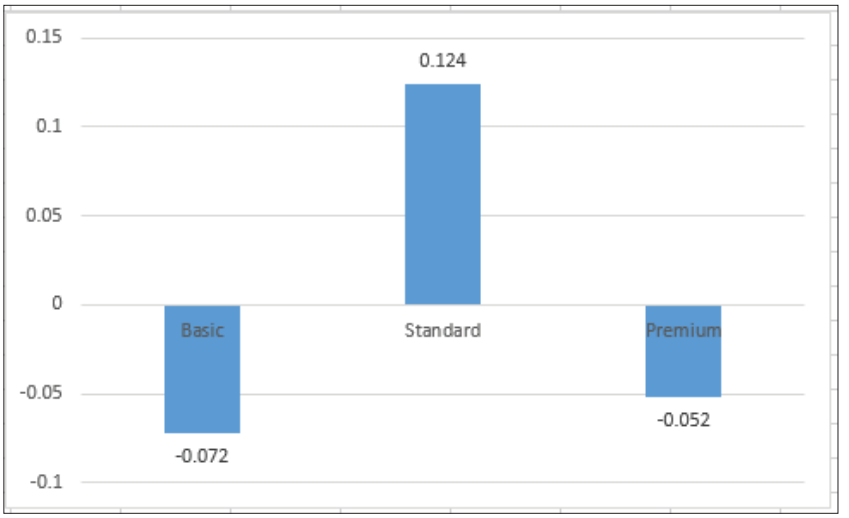

Figure 4: Utility of variety in spaces

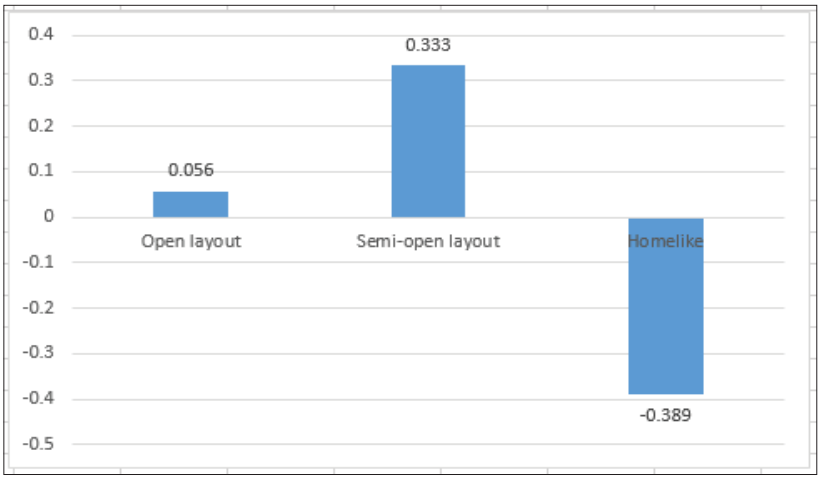

Figure 5: Utility of layout space

For the variety of spaces, the highest preference is the standard type due to the higher utility (0.124) compared to basic (-0.072) and premium (-0.052). The least preferred type is the basic having the lowest utility (-0.072) out of all the three (refer Figure 3). While for the layout space, the semi-open layout has the highest utility which means that the respondents have higher preferences for semi-open layout. Closed layout has the lowest utility which shows less preference towards that type of layout space.

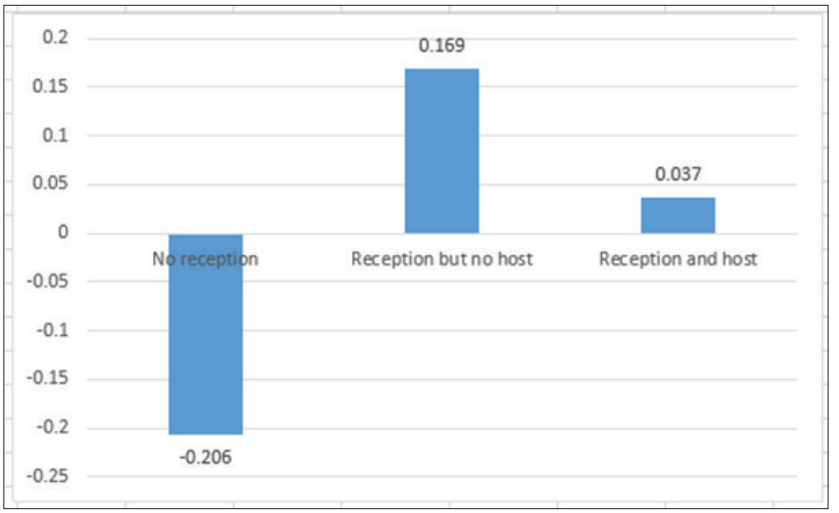

Figure 6: Utility of reception and hospitality

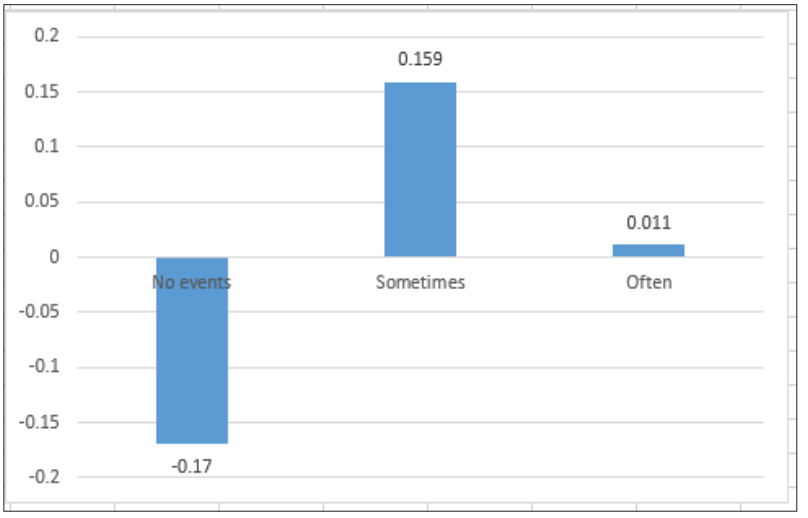

Figure 7: Utility of events

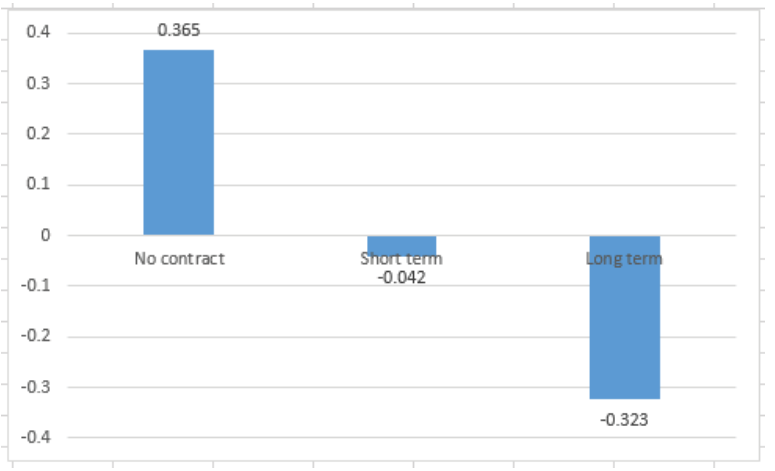

Figure 8: Utility of type lease contract

For reception and hospitality, the highest preference would be the reception but no host with the highest amount of utility (0.169). The lowest utility is the no reception and no-host (-0.206) indicating the least preferred among the three (refer to Figure 5). The highest utility for events to be held is sometimes (0.159) which indicates a high preference towards having events at the coworking space sometimes. While the lowest utility which shows the least preference is having no events at all (-0.17) (refer to Figure 6). The data collected indicates that having no contract has the highest utility which shows that having no contract has a higher preference. Meanwhile, for long-term contracts, it has the lowest utility which indicates that it is the least preferred for the type of lease contract (refer to Figure 7).

The conclusion that accessibility is the most crucial factor to consider when selecting a coworking place is consistent with earlier research. In terms of accessibility, the attribute level accessibility by vehicle and public transport exhibits the highest part-worth utility. This finding implies that coworkers like coworking facilities that are easily accessible by both car and public transportation. Coworkers more frequently select a coworking space that is close to their house and in a more convenient and central location.

The findings indicated that coworkers place the least value on amenities/services including reception and hospitality, events, and diversity in spaces. This is an intriguing discovery since these amenities and services could foster a stronger sense of community among coworkers. One explanation could be that fewer sample users selected belonging to a community as one of their top three reasons for working in a coworking space. Additionally, coworkers oppose having a coworking host. This is interesting because a coworking host's primary goals are to assist tenants, foster a positive work environment, and encourage collaboration among coworkers. The respondents in this sample work at coworking spaces without coworking hosts, which may have influenced their decision, therefore this outcome is likely. Additionally, it's likely that these people do not see the extra value of a host and would be content with a straightforward reception.

This study also revealed that coworkers favour an office setting with a mix of open and closed workplaces for various job activities. Previous research in single-tenant offices has shown

that entirely open-plan workspaces may cause issues with noise, privacy, and concentration and it appears to be the same for co-workers too. According to this study, coworkers prefer a standard coworking environment with informal gathering areas. They probably favour these settings because the chance to engage with other people is one of the reasons, they choose to work at coworking space. On the other hand, the findings revealed that the diversity of spaces was the coworking space's least crucial feature. Facilities that could be of a premium is not the priorities of the co-workers. This could be explained by the fact that the respondents in this sample choose coworking spaces that are affordable and lack extra amenities.

5. CONCLUSIONS AND RECOMMENDATIONS

The shift in the knowledge economy has led to the proliferation of co-working as a modern form of work realized in a shared work environment and has led the number of coworking spaces in Kuala Lumpur to increase drastically over time (Yeo, 2021). This paper has applied the notion of curating to comprehend the user's perspective of the Kuala Lumpur coworking space. Through the study on this phenomenon, this paper has successfully determined and identified seven attributes with each attribute contains three attributes level for user preferences on the coworking space in Kuala Lumpur. This finding implies that coworkers like coworking facilities that are easily accessible by both car and public transport. As for coworking space has a lively and creative atmosphere, the homelike type has the highest utility. According to the assessments made at this level, coworkers prefer a homely atmosphere over a modern one. Regarding the layout space, coworkers are keen towards semi-open layout rather. Beside that, coworkers prefer not to have a leasing contract on average as the no lease contract has the highest utility compared to short and long term contracts. This provides fresh perspectives on coworking space user preferences that can be applied to the planning or creation of coworking spaces. The findings of this study can therefore be used to create new theories about how and why a multi-tenant workplace is becoming more and more commonplace around the world. The variation of results from the analysis indicates that not all users are fully adapted to the concept of working in a collaborative driven workplace as the concept of co-working space is generally still new in Malaysia. Overall, the co-working movement has significantly transformed the way we work by offering a smart solution that goes beyond traditional design. It is more than just an office alternative but is a service-oriented real estate business that has the ability to facilitate socialisation of knowledge.

5.1 Limitation

There are obviously some drawbacks to this study. First, the questionnaire did not ask about the characteristics of the present coworking spaces where the majority of respondents work. As a result, the relationship between their present situation and preferences could not be examined. Future research should take respondents' existing circumstances into account as a control variable because they might affect their decision to choose the hypothetical coworking space.

Additionally, the preferences for conventional coworking space amenities or services like a coffee shop, event venue, lounge area, fitness centre, or bar were not thoroughly examined. In the attribute "diversity of supply spaces," these were integrated. These traits or other techniques could be used in future research to gain better understanding of a coworker's unique requirements and preferences. On top of that, the scope of the study was limited to users of coworking space in Kuala Lumpur. Thus, the results may not be applicable to represent other parts of Malaysia.

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