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HOUSING COMFORT AND RESIDENTIAL SATISFACTION RELATIONSHIP: MANAGEMENT SERVICES AS MEDIATOR

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ABSTRACT

Studies have mentioned the importance of management services in managing high-rise residential buildings. This role also aligns with the rules and regulations mentioned in the Strata Management Act 2013. However, the role of management in influencing the relationship between housing comfort and residential satisfaction also remains incoherent. This article aims to examine the role of management services in mediating the relationship between housing comfort indicators and residential satisfaction. The indicators of housing comfort include indoor air quality, visual comfort, thermal comfort and noise. A survey was conducted to obtain data from residents of medium-cost high-rise residential buildings surrounding the Capital City in Malaysia which are Johor Bharu, Johor, Shah Alam, Selangor and Georgetown, Pulau Pinang. The approach of partial least squares structural equation modelling (PLS-SEM) was used. The results indicate that management services only partially mediate the relationship between indoor air quality and residential satisfaction. The findings contribute to a better understanding of the management services viewpoint on residents of medium housing especially related to housing comfort. Additionally, this study makes a practical contribution in terms of increased awareness for developers, government, housing management, and residents when it comes to housing comfort and management for human well-being in high-rise residential buildings.

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1. Introduction

According to Buhaug and Urdal (2013) assert that urbanization is driven by population growth and rural-urban migration. Urbanization, in particular, increases demand for housing, resulting in the emergence of landed to high-rise residential types. High-rise residential property is distinct from other types of property. The creation of dwelling units on a single lot is the primary distinction between high-rise residential and landed property. The uniqueness of high-rise residential can be seen by establishing management in the property after it has been occupied Che-Ani et al. (2010). Management services are essential for the housing sector especially for high-rise residential buildings. As mentioned in the Strata Management Act 2013, the management corporation needs to manage its common area. They are responsible for the common area within the housing and the account management

as this maintenance fund is essential to run the operations (SMA, 2013).

Previous studies show that management services positively influence housing performance, with the same impact on residential satisfaction. Varady and Carrozza (2000) opined that tenants in their study rated reasonable satisfaction towards management services. Also, homeowners of low-cost housing in Klang Valley are satisfied with their dwellings and neighbours also indicated satisfaction with the relationships with management (Muhamad Ariff, 2018). Musa et al. (2020) also revealed that management services have a good reputation given by the residents of medium-cost vertical residential buildings in Klang Valley. In single-mother households study in South Korea, management services also become an important predictor for residential satisfaction (Cho, 2020).

On the other hand, management services also negatively impact housing performance and residential satisfaction. Che-Ani et al. (2009) revealed that most of the residential high-rise buildings were not effectively managed. The residents complained of incompetent facilities management such as dysfunctional lifts, the rubbish collection not being according to schedule and damages due to vandalism. It indicates that many buildings were managed by incompetent management. In addition Tiun (2009) discussed a lack of consideration on issues relating to building management and maintenance, lack of regulation on property managers, insufficient legislation, and professionalism in property management and maintenance. Also in Che-Ani et al. (2010), management became more ineffective and revealed the residents were less satisfied with every criterion of sustainable housing indicators than Management Corporation (MC). Azali et al. (2020) supported these findings that low staff quality enhances ineffective management services. This is due to the staff of the management corporation (MC) assuming their contribution as voluntary work without specific goals and objectives. Additionally, management services in high-rise residential buildings receive repair costs or utility charges inefficiently (Suffian, 2013). This situation will cause harm to residents as mentioned by Leung et al. (2016) that good management is considered to be crucially important for improving the quality of life (QoL).

The above contradictory findings imply that management services have a heterogeneous impact on the relationship between housing performance factors and residential satisfaction, highlighting the importance of considering alternative explanations for management services' role in facilitating housing performance.

Therefore, this research is to examine the mediating role of management services on the relationship between housing comfort and residential satisfaction.

2. Literature Review

2.1. Housing Comfort

Comfort is described as a state of well-being in which a person's physiological and psychological needs are fulfilled and balanced (Adriaanse, 2007; Amérigo & Aragones, 1997). In a housing study, residents' comfort is often influenced by how the building's ventilation is built and the exterior features that affect the building's appearance (Preiser & Schramm, 1997; Sanni-Anibire & Hassanain, 2016). So, a building's primary function is to have a comfortable indoor environment in order to prevent negative consequences on health, comfort, and general well-being (Frontczak, Andersen, & Wargocki, 2012). For this study, there are four (4) indicators categorized under housing comfort which are indoor air quality (IAQ), visual comfort, acoustic (noise) and thermal comfort (Hassanain, 2008; Kennedy et al., 2015; Lai & Yik, 2009; Nasrollahi & Shokri, 2016; Wang et al., 2015).

a) Indoor Air Quality

The health level of a building is primarily attributed by its indoor air quality, whether mechanically controlled or merely natural (Mohammed, 2011). A comfortable and productive interior environment requires a high level of indoor air quality and can profoundly affect the occupant's health. Good indoor air quality in buildings is critical to ensure sufficient indoor ventilation (Ormandy & Ezratty, 2012). It also needs to avoid inducing any bad health symptoms by preventing inferior indoor air quality. Symptoms such as eye, nose and throat irritation, fatigue, headache, wheezing, nausea, and dizziness are signs of an uncomfortable and unhealthy indoor environment (Sterling et al., 1993).

Besides, good airflow inside the house and throughout corridors is crucial to ensure fresh air and especially critical during the summer season (Asif, 2006). Adequate ventilation is also essential in bringing fresh air to habitable spaces where people live, especially in multi-storey buildings (Muhsin et al., 2016). Most houses rarely installed and use air conditioning units, while axial and ceiling fans are the

most commonly used apparatus for adequate ventilation (Sakka et al., 2012).

Other than that, unpleasant odours inside and outside the house can be inevitable due to the residential unit's limited space. However, it can be reduced with good indoor air quality (Khair, 2014; Lai & Yik, 2009). Besides, acceptable indoor air quality will provide sufficient oxygen air exchanges, eliminate foul odour, and be devoid of particles that can cause respiratory ailments (Carpenter & Oloufa, 1995).

b) Visual comfort

Visual comfort is defined as being free from discomfort, pain, or distraction. Visual comfort in space is strongly related to surface contrast and brightness diversity (Nasrollahi & Shokri, 2016). It is also an entire process of designing lighting to provide appropriate brightness for visual activities (Li, 2010). Therefore, visual comfort is strongly influenced by lighting, particularly during daylight (Andargie et al., 2019; Lai, 2013; Nasrollahi & Shokri, 2016).

Daylighting is a passive approach that enhances the vitality, performance, and visual comfort of residents. This element is essential in architecture and requires a proper plan for buildings' energy consumption (Li, 2010). Integrating daylight with artificial lighting is strongly suggested as a method in enhancing visual comfort in a sustainable strategic plan. By allowing natural daylight brightness into a building creates a pleasant indoor environment and allows the residents to have a good visual connection with the outdoors (Nasrollahi & Shokri, 2016).

Inadequate supply of daylight element results in discomfort within structures and open areas. Besides, lighting levels' adequacy in the building's corridors also contributes to visual comfort (Hassanain, 2008).

c) Acoustic (Noise)

Noise is subjective and one man's music might be another man's noise (Croome, 1977). Noise is one of the most common environmental problems for people. Noise bothers because it obscures other noises, complicates intellectual work, disrupts people's attention and concentration, produces physiological arousal, and elicits negative affective/emotional reactions (Wang et al., 2015). The majority of prior research have demonstrated that noise affects the physical and psychological health of building occupants.

Noise has evolved into a major element of comfort, alongside peace and silence, interaction with nature, and vision (Frontczak et al., 2012). Both interior and exterior noises do have an impact on residents' daily life. The most bothersome form of noise was determined to be traffic noise, followed by neighbour and animal noises (Kennedy, Buys, & Miller, 2015; Nicol & Wilson, 2004; Wang et al., 2015).

Mechanical noise (elevators, lifts, heaters and air conditioners) also contributes to acoustic discomfort (Lai & Yik, 2009; Xue et al., 2016). Other than that, residential noise problems are becoming severe in high-density housing areas, particularly in multi-storey buildings, rental accommodation areas, and highly urbanized areas due to more expansive spaces and a direct path to noise components like roads, railway tracks, rooftop water pumps or ventilation equipment on other structures (Kennedy et al., 2015; Lai & Yik, 2009).

Additionally, a bad acoustic environment has a detrimental effect on the psychological health of people. Uncomfortable and noisy environments cause disruptions and disrupt occupants' focus, resulting in agitated residents (Hassanain, 2008; Wang et al., 2015).

d) Thermal comfort

Thermal comfort is accomplished by balancing the occupant's heat exchange with the surroundings (Hassanain, 2008). Thermal comfort is the most extensively researched component of comfort. As such, most studies have assessed the relationship between thermal comfort and indoor thermal conditions such as air movement, air temperature, the temperature of the surrounding surfaces and relative humidity (Andargie et al., 2019; Hassanain, 2008; Kennedy et al., 2015).

A basic guideline is that the indoor constructed environment should maintain a comfortable temperature, neither too hot nor too cold, neither too moist nor too dry. Additionally, there should be enough air movement to attain that level of thermal comfort. Besides, it is critical to realize that various areas require varying degrees of temperature, ventilation, and humidity (Kennedy et al., 2015; Mohammed, 2011).

Thermal comfort is also influenced by the building materials used during the building's construction. Each building material has different specifications regarding the weather and its uses. Other than that, excessive consumption of electricity will also affect the thermal comfort inside the building. Inoptimal electricity use will negatively impact the occupants' safety and increase the heart rate of residents in a residential unit. The population's daily activities are also influenced by heat and cooling rates as occupants will spend more

time comfortably in good thermal comfort conditions (Voordt & Wegen, 2005).

2.2. Management Services as Mediator

A mediator is an intervening variable or mechanism that transfers the effect of an antecedent variable to the result (Aguinis et al., 2017). In other words, mediation is the study of how a third variable influences or intervenes in the relationship between two other variables (Hayes, 2018). The mediation effect exists when the effect of the independent variable X on the dependent variable Y is mediated by a third variable, M, called the mediating variable or mediator. Prior studies have acknowledged that management services support housing comfort in high-rise residential buildings.

As for housing comfort in high-rise residential buildings, the indicators' performance is greatly influenced by the building's shape, design, and spaces (Ali, 2013; Andargie et al., 2019; Chan & Liu, 2018). Usually, these indicators will be planned and designed by the architect and planner during the pre-construction phase (Okoye et al., 2020). Therefore, to improve the housing comfort condition, cooperation between housing management and residents is crucial.

Although the majority of housing comfort indicators were developed during the construction phase, there is a possibility for housing comfort to be enhanced through collaboration between housing management and residents. For indoor air quality and thermal comfort, the residents can enhance ventilation, humidity and temperature in enclosed spaces via natural ventilation and mechanical ventilation (Andargie et al., 2019; Zalejska Jonsson & Hungria Gunnelin, 2019). Additionally, visual comfort may change regularly and is generally unequal between spaces due to its dependency on a building's location (Carlucci et al., 2015). Thus, this challenging task requires the role of residents as they can always relocate the equipment according to their wishes (Andargie et al., 2019).

As neighbours, drainage systems and traffic become the primary contributors to noise (Andargie et al., 2019; Jeon et al., 2010). These indicators may be improved through collaboration amongst neighbours to reduce their noise and proper maintenance of the drainage system by the housing management. Although traffic noise is influenced by an incompatible architectural idea with the building's location and neighbourhood condition (Okoye et al., 2020), this issue can diminish residents' tranquillity. It may, however, be reduced by selecting proper building insulation materials at the pre-construction design stage. This approach may potentially enhance the building's capabilities in providing housing comfort for the residents.

Therefore, this current study fills the gap by investigating the role of management services as a mediator of housing comfort and residential satisfaction relationships. This study proposes the following hypotheses on the HC→MS→RS relationship.

i. H1: IAQ→MS→RS: Management services positively mediate the relationship between indoor air quality and residential satisfaction
ii. H2: TC→MS→RS: Management services positively mediate the relationship between thermal comfort and residential satisfaction
iii. H3: AN→MS→RS: Management services positively mediate the relationship between acoustic (noise) and residential satisfaction
iv. H4: VC→MS→RS: Management services positively mediate the relationship between visual comfort and residential satisfaction

Therefore, this study will focus on four (4) indicators as the independent variables (IV), residential satisfaction as the dependent variable (DV) and management services as the Mediator. Figure 1 shows the conceptual framework of the study.

3. Methodology

3.1. Instrument Design

The survey method was adopted in this study, and data were collected using a structured questionnaire as it aims to predict the management services mediating effect on the housing comfort and residential satisfaction relationship. There are ten (10) items for background information in Section A. Next, four indicators in housing comfort (HC) were measured using 13 items. The housing comfort dimensions focus on indoor air quality, thermal comfort, acoustic (noise) and visual comfort. The final section, which are the dependent variables (RS), has four items which are focused on overall satisfaction, duration of stay, retention and recommendation. For management services, which is the mediator in this study, there are 5 items covered in maintenance, rules and regulations, response to complaints, maintenance fee collection and handling with the defaulters.

The various constructs and their sources are presented in Table 1. A five-point Likert scale was used to measure all the exogenous independent latent variables (IAQ,TC, AN, VC) and mediator (MS) while a seven-point Likert scale was adopted for the

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endogenous dependent variable (RS). All constructs were measured as reflective constructs. It should be noted that both the dependent and independent variables were collected from the same respondents (residents in high-rise residential buildings). Therefore, the issue of common source bias could be an issue in this study. This issue has been addressed by using two distinct scales (five and seven-point Likert scales) were used to represent independent and dependent variables suggested by Jakobsen & Jensen (2015) . The second is to ensure that the questionnaire is free of ambiguity by performing pilot testing, as recommended by (Podsakoff et al., 2003). This was done to ensure the content and construct validity of the study. Following the pilot survey's findings, a few items were deleted, some question wordings were reworded, and some phrases were inverted in the final version of the questionnaire.

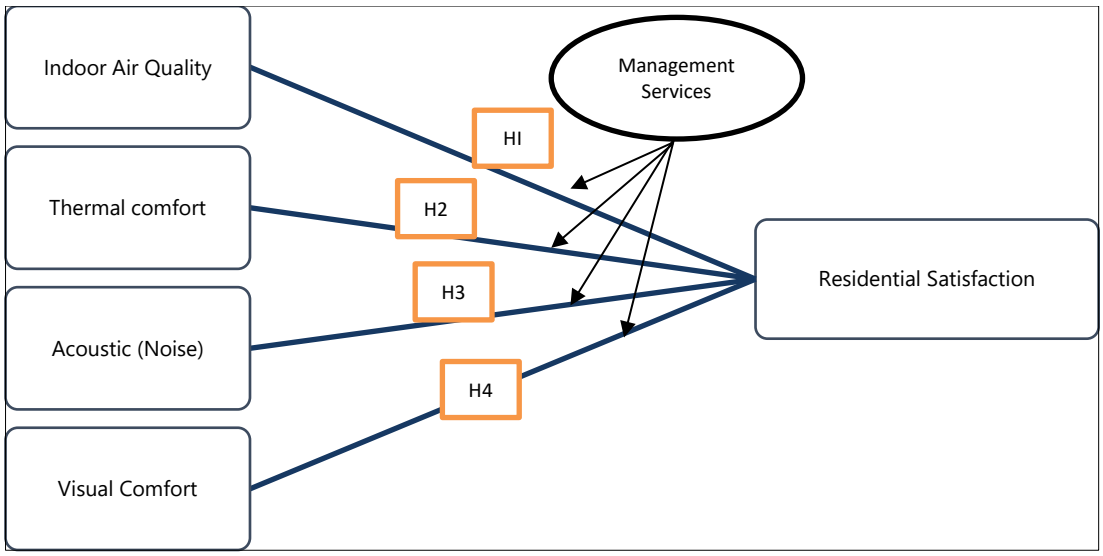

Fig. 1. Conceptual framework. *Source*: own study.

Table 1

Construct measurement and references

No	***Housing Comfort (HC)***	***References***
1	*Indoor Air Quality (IAQ)*	
1a	Air quality inside the house	Jaunzens, Grigg, Watson, & Picton (2003); Hassanain (2008)
1b	Air quality throughout the corridors	Jaunzens et al. (2003); Ge & Hokao (2006)
1c	Air ventilation inside the house	Yim, Lee, Kim, & Kim (2010); Salleh et al. (2013)
1d	Indoor and outdoor odor	Ge & Hokao (2006); Lai & Yik (2009)
2	*Thermal comfort(TC)*	
2a	Indoor heating condition	Meir et al. (2009); Leaman, Stevenson, & Bordass (2010); Bennet & O'Brien (2017)
2b	Indoor relative humidity	Ralid (2003); Bennet & O'Brien (2017)
2c	Indoor and outdoor temperature	Yoshino et al. (2006); Aflaki, Mahyuddin, & Baharum (2016); Jeong, Jeong, & Park (2016)
3	*Acoustic (noise)(AN)*	
3a	The noise pollution by traffic	Bakhtyar, Zaharim, Sopian, Saadatian, & Abdulateef (2012); Wang, Si, Abdul-Rahman, & Wood (2015)
3b	Noise pollution by mechanical systems	Hassanain (2008); Husin, Nawawi, Ismail, & Khalil (2014)
3c	Noise pollution by neighborhood	Ibem & Aduwo (2013); Wang et al. (2015)
4	*Visual comfort (VC)*	
4a	Condition of indoor natural lighting	Ibem & Amole (2013); Salleh et al. (2013)
4b	Condition of indoor artificial lighting	Ioannidis et al. (2016); Andargie, Touchie, & O'Brien (2019)
4c	Adequacy of lighting levels in the corridors of the building	Kim et al. (2005); Mohit & Azim (2012)

Source: own study.

3.2. Study Location and Sample Size

The unit of analysis for this study are high-rise residential buildings. The residents (owner or renter)

lived at medium cost housing in high-rise residential projects in three (3) State capitals: Shah Alam, Selangor, Johor Bharu, Johor and Penang Island Pulau Pinang. This population was chosen because, first, the total area is similar between each State Capital. Second, they also rank as the top 3 in the report for the total number of high-rise residential buildings (NAPIC, 2020). Third, according to State statistics for January – September 2019, these areas also ranked high in cases lodged in the Tribunal for Strata Management (KPKT, 2019). Besides, the medium-cost housing occupied by medium (M40) and low income (B40) groups enclose about 80% of citizens. In terms of the criteria set out for the participant, he or she must be a resident (owner or renter) who has been living at medium cost high rise housing for at least six months, the residential unit's size must be greater than 700 sqft but less than 1000 sqft (suitable with characteristics for medium-cost housing) (Ani, Sairi, Tawil, Wahab, & Razak, 2016), the selected housing scheme must offer similar services and facilities, as well as already having an established the Management Corporation (MC).

Stratified random sampling is implemented, and the sample size was determined using the inverse square root method recommended by Kock and Hadaya (2018). The partial least squares structural equation modelling (PLS-SEM) technique using WarpPLS software is due to suitability to analyzing this research's complex model, consisting of an exogenous, endogenous and moderator. Besides, WarpPLS software can be used as confirmation to the theory (hypothesis testing) with provided P values, path coefficient and T-values (Kock, 2016b). The recommended minimum sample size is 279 samples. The questionnaire was self-administered because of the greater response rate of self-administered questionnaires than internet surveys (McGuirk & O'Neill, 2016). The researcher circulated 540 surveys and obtained 434 usable replies. The number of legitimate responses received was above the necessary 279, and as such was deemed sufficient.

4. Data Analysis

For the reflective measurement model, there are three (3) assessments that need to be checked, i.e. internal consistency, convergent validity and discriminant validity (Hair, Hult, Ringe, & Sarstedt, 2014; (Hair, Hult, Ringe, & Sarstedt, 2014; Kock, 2020; Ramayah, Cheah, Cuah, Ting, & Memon, 2018; Kock, 2020). Internal consistency is assessed using Cronbach's Alpha, Composite Reliability and Dijkstra-Henseler Rho_A. All the indicators met the thresholds for Composite Reliability, Cronbach alpha and Dijkstra-Henseler Rho_A where the cutoff point is 0.7, confirming the internal consistency of the variables (Kock & Lynn, 2012; Dijkstra & Henseler, 2015; Hair, Hult, Ringle, & Sarstedt, 2017; Kock, 2020).

Next, the convergent validity was examined by cross-loadings and Average Variance Extracted (AVE). All items exceed the recommended value of AVE and loading values are above 0.7 (Byrne, 2016). Also, for discriminant validity, the cross-loading values for all indicators are distinctly different and high on their own when comparing the values between the indicators (Hair. et al., 2017). Besides, all the HTMT value also deliver the criterion with an HTMT value lower than 0.9 (Gold, Malhotra, & Segars, 2001) when using Heterotrait-Monotrait (HTMT) techniques developed by Henseler, Ringle, & Sarstedt (2014). Therefore, the test fulfilled the requirement for measurement model analysis.

5. Results

5.1. Profile of Respondents

As a whole, the final useful sample consists of 434 respondents, with an 80.4% response rate. The respondents were males (49.3%) and females (50.7%). Referring to age, respondent's age between 31-40 years old contributed to 37.3%. The sample was dominated by married respondents, constituting 83.2%, followed by only 12.4% of single respondents and 4.4% for others, which means widowers. Regarding the number of households, half of the respondents stay with 3-4 people in the housing unit (49.8%), 27.6% of respondents stay with 5-6 people, and 4% live more than eight people in one housing unit. These results showed that many respondents live in the space that are appropriate for the housing ratio. Moreover, considering the occupation sector, about 46.1% work in the private sector compared to the government sector, which only scores 20% of the total number of respondents. The results also illustrated that many respondents have their own business (33.6%) and 0.2% scores of others representing the retiree.

Income becomes an essential determinant of homeownership (Logan et al., 2010; Li & Chen, 2011). The result showed 37.1% of respondents had a household income between RM4000 until RM5000. Other than that, 36.2% of the respondents got a lower household income in the range of RM3001-RM4000. This measurement determines that many respondents come from the B40 group (B3 and B4), approaching the

medium income group based on the new income group classification by the Department of Statistics Malaysia for 2020. In terms of ownership, the percentage of house owners and renters is quite similar, amounting to 53.7% and 46.3% respectively. Also, 36.9% of total respondents already live at the housing scheme in between 1 to 5 years, followed by 6 to 10 years (29.5%), 11 to 15 years (13.6%), more than 15 years (13.1%) and less than one (1) year (6.9%).

5.2. Structural Model Analysis

There are four (4) steps that need to be accomplished recommended by (Hair et al., 2014) to measure the structural model. The assessments assess the significance and relevance of the structural model relationships, assessment of the level of R^2, review of the effect size (f^2) and assessment of predictive relevance Q^2.

For assessment of the significance and relevance of the structural model relationships, Figure 2 shows the significance of three of four exogenous variables' relationships with an endogenous variable based on Hair Jr. et al. (2017) criteria which are p-value <0.05. In this model, Indoor Air Quality has the larger path coefficient (0.342) than Thermal Comfort (0.186) and Acoustic (Noise) (0.132). For the R^2 coefficients, the value is 0.346, with Adjusted R^2 coefficients valued 0.340. This value is above the 0.26 value that Cohen (1988) recommended, which indicates the accepted model.

For the Effect Size (f^2) assessment based on Cohen (1988), Indoor Air Quality (0.186), Thermal Comfort (0.091) and Acoustic (Noise) (0.062) have a medium effect in producing the R^2 for Residential Satisfaction. For the predictive validity Q^2 to be acceptable, the Q^2 coefficient must be greater than zero (Kock & Gaskins, 2014; Hair Jr. et al., 2017). The Q^2 value obtained in this study is 0.326, which is substantially above zero. Therefore, it shows that the exogenous constructs have predictive relevance for the endogenous construct (residential satisfaction). In conclusion, the model suits the data well because all the measured criteria for the structural model were within the appropriate thresholds needed.

5.3. Mediation Analysis

In order to determine the mediation effect of each hypothesized path, the path coefficient, standard error, p-value, t-value, effect size and confidence interval of indirect effect were assessed, with the results shown in Table 2.

Mediation analysis was reported using the bootstrap test (Preacher & Hayes, 2004, 2008). Based on Table 2 displays only one (1) relationships : IAQ → MS → RS is significant based on p-value ≤ 0.05 and t-value ≥1.645 (Kock, 2014; Cepeda-Carrión et al, 2017) with significant confidence interval.

The results for path coefficients of IAQ → MS → RS, β = 0.07 with a p-value of 0.019 and medium effect size (0.038) (Cohen, 1988). Besides, the bootstrap test of the bias-corrected confidence interval (lower level [LL] = 0.166, upper level [UL] = 0.348), supporting the presence of a mediation effect (Preacher & Hayes, 2004). The results confirmed supporting H1 when the management services mediate the relationship between indoor air quality and residential satisfaction.

In identifying the type of mediation, the results for total effect, direct effect and indirect effect were analyzed (Cepeda-Carrión et al., 2018). Based on Table 3, there is a significant direct effect for IAQ → MS → RS with p-value = <0.001 (p ≤ 0.05) and t-value 7.456, more than ≥ 1.645 (Preacher & Hayes, 2004; Ramayah et al., 2018). Therefore, this type of mediation is called a "partial mediation", since the direct effect of IAQ on RS is significant. In this case, the partial mediation effect existed based on the result of mediating and direct effects in the IAQ → MS → RS relationship.

6. Discussion

This study examined the mediating role of management services on the relationship between housing comfort and residential satisfaction. From the results, there is only one supporting hypothesis (H1), i.e. that management services positively mediate the relationship between indoor air quality (IAQ) and residential satisfaction. The results also proposed the relationship as partial mediation.

The findings signify the importance of management services as a mediator. For high-rise residential building, this type of building is bound to Strata Management Act 2013. This act mentions the management's responsibility in the housing scheme in managing the common area of the buildings (SMA, 2013). As a result, the management is in charge of managing the facilities and ensuring that the housing is in excellent condition in order to ensure good quality for the residents.

Management services can either be in-house or outsourced (Azali et al., 2020; Hui, 2005; Olanrele et al., 2014). Inhouse management is when people are directly hired by the Management Corporation or the committee members themselves. Otherwise,

outsourced is when the Management Corporation (MC) hires contractors to manage the housing area (Azali et al., 2020; Ho & Liusman, 2016).

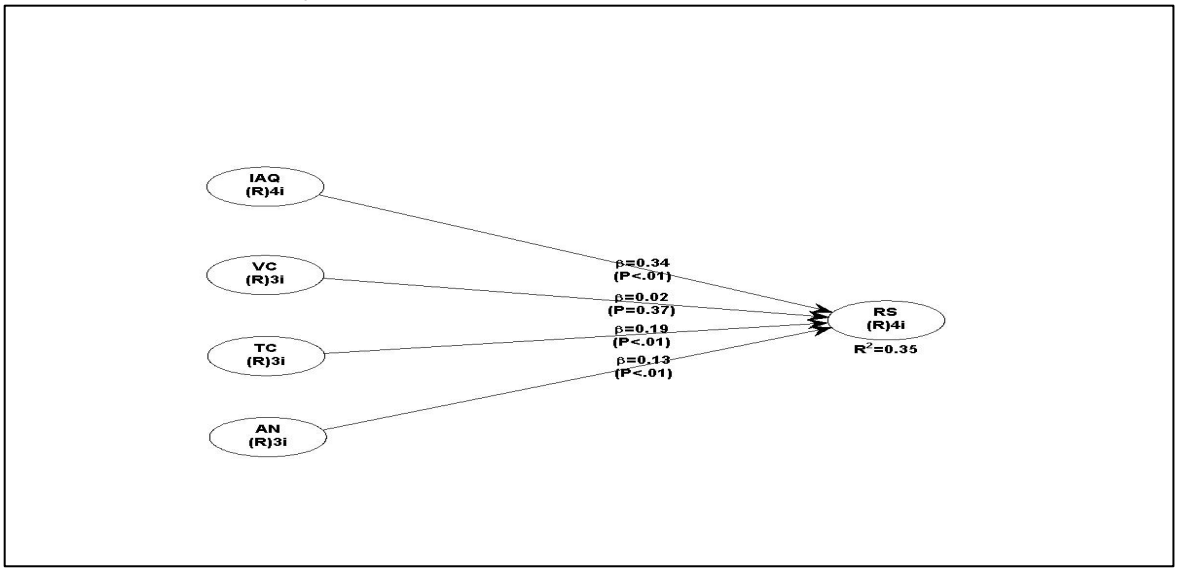

Fig. 2. Structural Model *Source*: own study.

Table 2

No	Hypothesis	Path coefficient	Standard error	P values	T values	Effect size	Confidence interval		Interpretation
1	H1= IAQ → MS → RS	0.07	0.034	0.019	2.059	0.038	0.166	0.348	Supported
2	H2= VC → MS → RS	0.058	0.034	0.042	1.706	0.027	-0.024	0.162	Not Supported
3	H3 = TC → MS → RS	0.042	0.034	0.108	1.235	0.02	0.05	0.234	Not Supported
4	H4 = AN → MS → RS	0.058	0.034	0.043	1.706	0.027	-0.18	0.006	Not Supported

Source: own study.

Table 3

Hypothesis	Path coefficient	Standard error	P values	T values	Effect size	Decision
H1 = IAQ → MS → RS	0.07	0.034	0.019	2.059	0.038	Significant
Total Effect	0.327	0.046	<0.001	7.108	0.178	
Direct Effect	0.342	0.046	<0.001	7.456	0.186	Significant
						partial mediation

Source: own study.

Since outsourcing is viewed as a strategic option between internal and external resources (Katzler, Berggren, & Gustafsson, 2017) and due to building management and maintenance complexity, these jobs are frequently outsourced (Hui, 2005; Lam, 2007). IFMA (2006) supported this statement, mentioning that housing management, building maintenance, architectural design and engineering are the most often outsourced services.

Besides, professional involvement, a greater workforce and more experience in housing management motivate the housing management to be outsourced (Hui, 2005). Additionally, homeowners might have better peace of mind knowing that their buildings are in capable hands with outsourcing (Ho & Liusman, 2016). In order to minimize cost, certain housing management companies outsourced just those services that needed core competency of relevant specialists, such as sewage treatment and internet/DSTV systems (Olanrele et al., 2014). Otherwise, from another perspective, outsourcing may be much less costly than in-house staffs due to the competitiveness that engenders effectiveness in

organizational and technological abilities (Carswell, 2017; Lam, 2012).

Engagement with a professional property management company with professional skills and knowledge in providing management services is crucial in ensuring good performance of housing function and subsequently increasing residential satisfaction (Che-Ani et al., 2009; Musa et al., 2020). A property management company is needed to support the homeowners in supervising security guards, contractors and cleaners, managing financial accounts, organizing meetings, handling correspondence and arranging repair and maintenance work to avoid unqualified individuals taking on the duties (Azali et al., 2020).

Most importantly, the company must be registered with The Board of Valuers, Appraisers, Estate Agents and Property Managers Malaysia (BOVAEA), as well as following the Malaysian Property Management Standards guidelines. A skilled property management firm is equipped with knowledge of human resource management, specifically on how to increase residents' awareness, sense of duty, and sense of belonging based on the guidelines. Also, the cooperation of a resident association with a property management company is the optimal approach to assure a high standard of housing in all aspects (Yau, 2013). Thus, with professional engagement in housing management in giving good management services, this scenario may contribute to the provision of safe, inclusive, and sustainable housing in order to meet the expectations on Sustainable Development Goals envisioned by the United Nations.

Therefore, these statements point out the importance of management services engaging with professional personnel. Besides, it also shows the importance of management services in mediating housing performance to influence residential satisfaction.

Based on the findings, the type of mediation effect is partial mediation. The direct effect of indoor air quality on residential satisfaction and the indirect effect of indoor air quality on residential satisfaction through management services are significant. This finding indicates that both variables (management services and indoor air quality) play crucial roles in influencing residential satisfaction.

The indoor air quality in this study consists of air quality inside the house, air quality throughout the corridors, air ventilation inside the house and indoor and outdoor odors that need housing management to control. Based on SMA (2013) guidelines, the management of high-rise residential buildings is required in supervising many aspects in common areas, such as building condition and cleanliness. However, management responsibilities cannot be successfully executed if the residents did not cooperate in maintaining the buildings. Therefore, mutual support between management and residents is crucial for adequate level of their indoor air quality.

As mentioned by previous studies from Azian et al. (2020) and Wahi et al. (2018), housing management faces many problems, such as lack of maintenance funds, and parking and building defects. These issues are never resolved, whether it is a new or an old residential building. Therefore, skilled and knowledgeable management must be considered when handling residential buildings, whether in-house or outsourced.

In addition to this, housing development authorities and The Management Committee should invest in attending seminars or workshops to improve their knowledge of building management, especially for indoor air quality components. Besides, the management can establish regular feedback channels to allow the residents to voice their concerns and suggestions to facilitate continuousl improvement.

The management also can implement programs to encourage social interaction among residents, which can increase feelings of belonging and comfort. Last but not least, cooperation with other management bodies is also essential in updating any regulations or parallel inputs over time. Therefore, this statement substantiates that management services partially mediate the indoor air quality and residential satisfaction relationship.

7. Conclusion

This study introduced the concept of management services as a mediator. The finding contributes theoretical insight to the body of existing knowledge by clarifying the effect of management services on housing performance and the residential satisfaction relationship. It expands explicitly on the idea expressed by Che-Ani et al. (2009) and Musa et al. (2020) regarding the need for management services as a mediator. Besides that, the findings provide statistical support for effective management services and the previously unknown involvement of management services as a partial mediator in the relationship between housing performance and residential satisfaction. Also, the study's findings contribute to the

advancement and understanding of complexity in the study model as a mediator and analyze its impacts on housing performance effectiveness via management services in high-rise residential buildings.

This study's findings give additional insight for professional property managers to be updated with housing performance in Malaysia and worldwide. Hence, this encourages people to prioritize housing performance, particularly in medium-cost housing buildings. Also, the housing division in the Ministry of Housing, and Local Government (KPKT) can receive updated information on the situation related to the housing performance in medium-cost housing. As for the government, which focuses more on low-cost housing development, these findings provide a valuable source of information for it and its regulatory agencies in gaining a better understanding of the reality of demand for medium-cost housing, which is typically occupied by middle-and lower income households. These findings will facilitate the analysis of demand and supply for this income group.

As with any other research, this research also has several limitations. First, the study concentrates on residents who live in medium-cost residential buildings in Johor Bharu, Johor, Penang Island, Penang and Shah Alam, Selangor. While the results could be generalized to similar cities, testing the research model on other areas in Malaysia will give a better understanding of the medium-cost housing situation in the country. Secondly, this study focuses exclusively on medium-cost high-rise residential buildings. Future research should focus more on alternative housing types such as low-cost or landed housing in giving a comprehensive review of housing performance factors and residential satisfaction relationships. Besides that, an interview with property management companies or housing development authorities can add new information regarding this issue for future research. Furthermore, future studies should investigate how specific management practices impact satisfaction over time and examine the experiences of different demographic groups. By addressing these implications, housing providers can enhance the quality of living in their communities, leading to greater resident satisfaction.

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