TO DETERMINE THE CUSTOMER SATISFACTION FACTOR TO ARCHITECTURE DESIGN OF MALAYSIA HIGH RISE RESIDENTIAL BUILDING PROJECTS DURING THE DESIGN AND PLANNING STAGE

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FACULTY OF BUILT ENVIRONMENT

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KUALA LUMPUR

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ABSTRACT

Customer satisfaction in high-rise residential buildings has evolved as an influential framework in psychology, personal life satisfaction, community lifestyle, health, and well-being. Architectural design has played a vital part in influencing the state and is the main aspect that will directly influence house buyer decisions in Malaysia. This study aims to determine the significant customer satisfaction element in high-rise residential architectural design based on the unit layout plan and project design. Furthermore, this study has specified the function of a professional architect in supervising and ensuring the quality of high-rise residential architectural design. This study employed a mixed-method approach, with quantitative data serving as the primary source of information. Structured interviews were conducted to validate the customer satisfaction factor in Malaysian high-rise residential buildings based on questionnaire findings. The results of the interviews were utilized to determine if the customer satisfaction factor was equivalent to a professional architect's high-rise residential building design requirements. A total of 189 questionnaires were sent to the intended house buyer at one of Malaysia's high-rise residential complexes. Seventy people responded, and their responses were determined to be beneficial for data analysis. Three of the project architects mentioned above were interviewed for the construction project.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS). From the data analysis, thirteen (13) primary factors in architectural design significantly affect customer satisfaction. They are House floor plan design; Quality of finishes

workmanship; Quality of materials used for floor and wall; Unit scale and proportion; Size of the rooms in the unit; Brightness or light in the unit during daytime; Location of different rooms; Safety and security; Building accessibility; Building durability and life span; Building orientation; Facility plan design and usage; Building performance requirements. While four (4) primary roles in terms of professional architect services to significantly affect customer satisfaction are Managing defects on architectural work; Project design control; Supervision skill on construction work, and Quality assurance on building work. According to the interview results, there is some disagreement between the customer satisfaction factor and the architect's point of view. Based on the data, it is possible to infer that the architectural design and services supplied by the architect in the high-rise residential impact customer satisfaction. As a result, greater emphasis is likely to be placed on those characteristics to increase consumer satisfaction with Malaysia's high-rise residential building architectural design.

Keywords: Customer Satisfaction, Architectural Design, Professional Architectural Services, High-rise residential Building

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ABSTRAK

Kepuasan pelanggan dalam bangunan kediaman bertingkat telah berkembang sebagai rangka kerja yang berpengaruh dalam psikologi, kepuasan kehidupan peribadi, gaya hidup masyarakat, kesihatan dan kesejahteraan. Reka bentuk seni bina telah memainkan peranan penting dalam mempengaruhi yang dinyatakan dan merupakan aspek utama yang secara langsung akan mempengaruhi keputusan pembeli rumah di Malaysia. Kajian ini bertujuan untuk menentukan elemen kepuasan pelanggan utama dalam reka bentuk seni bina bangunan kediaman bertingkat tinggi berdasarkan reka bentuk pelan susun atur unit dan reka bentuk projek. Tambahan pula, fungsi arkitek profesional dalam menyelia dan memastikan kualiti reka bentuk seni bina kediaman bertingkat telah ditetapkan. Kajian ini menggunakan pendekatan kaedah campuran, dengan data kuantitatif berfungsi sebagai sumber utama maklumat. Temu bual berstruktur telah dijalankan untuk mengesahkan faktor kepuasan pelanggan di bangunan kediaman bertingkat Malaysia berdasarkan dapatan soal selidik. Hasil temu bual telah digunakan untuk menentukan sama ada faktor kepuasan pelanggan adalah setara dengan keperluan reka bentuk bangunan kediaman bertingkat tinggi arkitek profesional. Sebanyak 189 soal selidik telah dihantar kepada pembeli rumah yang dimaksudkan di salah sebuah kompleks kediaman bertingkat di Malaysia. 70 orang menjawab, dan respons mereka ditentukan untuk memberi manfaat untuk analisis data. Tiga daripada arkitek projek untuk projek pembinaan yang disebutkan di atas sedang ditemu bual. Data tersebut dianalisis menggunakan perisian Statistical

Package for the Social Sciences (SPSS). Daripada analisis data, tiga belas (13) faktor utama dari segi reka bentuk seni bina memberi kesan yang ketara kepada kepuasan pelanggan. Ia adalah reka bentuk pelan lantai rumah; Kualiti mutu kerja kemasan; Kualiti bahan yang digunakan untuk lantai dan dinding; Skala dan perkadaran unit; Saiz bilik dalam unit; Kecerahan atau cahaya dalam unit pada waktu siang; Lokasi bilik yang berbeza; Keselamatan; Kebolehcapaian bangunan; Membina durabilitas dan jangka hayat; Orientasi bangunan; Reka bentuk dan penggunaan pelan kemudahan; Keperluan prestasi bangunan. Manakala empat (4) peranan utama dari segi perkhidmatan arkitek profesional yang memberi kesan ketara kepada kepuasan pelanggan ialah Menguruskan kecacatan pada kerja seni bina; Kawalan reka bentuk projek; Kemahiran penyeliaan kerja pembinaan dan Jaminan kualiti kerja bangunan. Mengikut keputusan temu bual, terdapat sedikit perselisihan antara faktor kepuasan pelanggan dan pandangan arkitek. Berdasarkan data, adalah mungkin untuk membuat kesimpulan bahawa reka bentuk dan perkhidmatan seni bina yang dibekalkan oleh arkitek dalam projek bangunan kediaman bertingkat tinggi memberi kesan kepada kepuasan pelanggan. Akibatnya, penekanan yang lebih besar mungkin akan diberikan kepada ciri-ciri tersebut untuk meningkatkan kepuasan pengguna terhadap reka bentuk seni bina bangunan kediaman bertingkat tinggi di Malaysia.

Keywords: Kepuasan Pelanggan, Reka Bentuk Seni Bina, Perkhidmatan Senibina Profesional, Bangunan kediaman bertingkat tinggi

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter went into the research's concept in great depth. The research background will be summarized in this chapter. It summarises significant ideas and models relevant to the study subject. As a result, problem statements will be defined. According to Henry (2008), a problem statement describes a present situation that has to be solved. The focus points give the framework for the research study and produce the questions that the research seeks to answer. In addition, the research objective will be specified to clarify the purpose or primary goal of the investigation. This chapter will also identify the study goals and research questions. The research goals are unambiguous descriptions of what the study aims to accomplish, while the research question is the precise topic the research will address. As a result, a particular research technique will be employed to find, select, process, and evaluate topic-related material. The scope of the research will next be discussed, including the degree to which the research field will be studied in work and the factors that will be functioning inside the study. Furthermore, the study's relevance will be addressed, and finally, a thesis format will be provided to provide a quick summary of the research.

1.2 Research Background

Numerous housing and residential projects have failed due to a lack of knowledge about the aspects that contribute to customer satisfaction (Salleh, 2008). Customer satisfaction measures how well people's housing needs are addressed (Salleh, 2008). The success of housing developers is defined not only by the construction of housing units but also by other factors affecting the housing market's demand (Salleh, 2008). According to Fakere et al. (2017), the assumption that residents' requests are met satisfactorily when the residential space accommodates them in terms of size is erroneous if residents' behavior in this space is misconstrued. Additionally, household satisfaction is a proxy for life quality since it implies that the home buyer's aims and expectations are met (Waziri et al., 2013).

Additionally, it refers to how satisfied house purchasers are with the features of their houses. A high level of residential satisfaction indicates that residents are delighted with their dwellings. A high level of resident engagement in the design of their homes is often correlated with a high level of homeowner satisfaction. On the other side, a high level of housing dissatisfaction has a detrimental effect on a family's comfort (Husna and Nurizan, 1987). Consequently, ensuring that house purchasers' needs are met throughout the design process positively affects resident satisfaction. The roles and contributions of home design specialists, notably architects, in identifying a country's housing difficulties are crucial (Olotuah and Ajenifujah,2009). According to Gagnon and Ward (2001), meeting customer expectations is the primary factor that contributes to customer satisfaction because it results in a solid and innovative business that can withstand times of change and adversity. Dovaliene (2007) examined the elements that directly and indirectly affect customer satisfaction to understand customer desires better and improve service delivery procedures.

According to Fakere et al. (2017), meeting occupants' needs throughout the design process positively affects their level of satisfaction. Housing is one of man's most essential needs, and house designers must ensure that consumers are as satisfied as possible with their dwellings. Fakere et al. (2017) also said that since man spends the bulk of his time in his home, including users in house design is a critical way for meeting users' housing needs. Additionally, Fakere et al. (2017) emphasized that home buyer involvement is a strategy for ensuring that users' housing environments align with their lifestyles to achieve residential pleasure. Additionally, designing houses that are a good match for the customers' lives leads to a high level of consumer contentment. Jiboye (2012), on the other hand, said that the bulk of public and private residential projects fail in developing countries such as Nigeria because the needs of the people are not effectively recognized or met. In Nigeria, resident participation in house design is the exception rather than the norm; this situation often results in low resident satisfaction.

1.3 Problem Statement

According to Streimikiene (2015), the right to a pleasant habitation includes more than four walls and a roof over one's head. Purchasing a "dream home," in this perspective, implies more than just choosing a location to live; it also involves considerations for the housing's quality and the surrounding environment (Sirmans, MacDonald, Macpherson, & Zietz, 2006; Wang, Ran, & Deng, 2012). This is because housing conditions substantially influence inhabitants' life satisfaction (Zhang, Zhang, & Hudson, 2018), highlighting the need to research the aspects that contribute to the desired quality of life based on housing choices (Coolen & Hoekstra,2001). Homebuyers are more concerned with their quality of life, with expectations differing according to their background, notably their gender, age, neighborhood, income, and ethnic origin (Yeoh, 2014). Most of the time, housing expenses are determined by common factors such as neighborhood, structure, and location (Saw & Tan, 2014; Thaker & Sakaran, 2016; Yap & Goh, 2017). However, house designers must better grasp how Malaysian home consumers vary in their perspectives, attitudes, and preferences towards home buying (Tan, 2011). In today's competitive market, property developers must propose that architects design homes with architectural traits that will never go out of style while retaining hedonic values.

As a consequence, they aim to design and build the best homes possible for owner-occupier customers that complement their lifestyle and instill a feeling of security and comfort (Yvonne, 2014). The purpose of this study is to analyze the architect's quality characteristics, as they have a significant impact on home purchasers' purchasing decisions on unit design, project design, and professional services. Since housing preferences vary significantly across geographical regions (Sirmans et al., 2006), this Malaysian-based study aims to shed light on the desired housing quality in an

outperforming emerging economy with a culturally diverse society on the verge of becoming a developed country in the tropical Southeast Asian region.

1.4 Research Aim

This research aims to discover the customer satisfaction element that will assist professional architects in monitoring the architectural design quality of Malaysia's high-rise residential construction projects.

1.5 Research Objectives

It is essential to thoroughly evaluate the existing literature and research results to accomplish the study objective. As a result, the following aims guide this study:

1. To identify the factor affecting customer satisfaction in the architectural design of Malaysia's high-rise residential building.
2. To determine the role of the professional architect in managing and assuring the high-rise residential architectural design quality.
3. To evaluate the customer satisfaction factor from both home buyer and architect perspectives.

1.6 Research Question

1. What factors affect customer satisfaction in the architectural design of Malaysia's high-rise residential building?
2. What is the role of the professional architect in managing and assuring the high-rise residential architectural design quality?
3. Is the customer satisfaction factor comparable to a professional architect's high-rise residential building design criteria?

To achieve the research aim and objectives, a survey must be done to answer the above questions.

1.7 Research Methodology

The quantitative research approach will be used to find answers to the aims mentioned above, while the qualitative research method will be used to comprehend ideas, views, or experiences.

Quantitative research is a technique in which variables are measured and quantified. Typical quantitative approaches include conducting questionnaire surveys with closed-format questions. Respondents must pick from a list of pre-selected responses and open-format questions to reply in their own words and manner.

Qualitative data, such as documents, interviews, and contractor observation data, is used in qualitative research. These data are natural, including the respondent's behavioral reaction and actual words. Ethnography, grounded theory, case studies, and action research are all examples of qualitative research.

In mixed method studies of educational evaluation, questionnaires and interviews are often employed in tandem (e.g., Brookhart & Durkin, 2003; Lai & Waltman, 2008). While surveys may give evidence of trends in large groups, qualitative interview data can provide more in-depth insights into participant attitudes, ideas, and behaviors (Kendall, 2008).

Although different kinds of questionnaires and interviews are studied in the literature review, the emphasis of this research is on comparing structured questionnaires with semi-structured interviews.

Stages will implement two strategies to achieve the objectives for the research, which are:

1. Qualitative research techniques are used at the start of each aim to acquire more data through literature reviews from earlier relevant publications. Participants reply to prompts in the structured questionnaire by picking prepared answers (e.g., multiple-choice replies); these data are often analyzed numerically. For example, gather data on the factors influencing customer satisfaction in Malaysian high-rise residential building architectural design to create an excellent theoretical grasp of the topic for this study.
2. Quantitative research techniques at the second stage of each goal, once the data from the first stage has been acquired, a questionnaire will be administered to determine if the customer satisfaction factor is equivalent to a professional architect's high-rise residential building design standards. Semi-structured interviews begin with a short number of open-ended questions, but interviewers spend substantial time examining

participant replies, pushing them to offer information and clarity; these data are often analyzed qualitatively.

1.8 Research Scope

The constraints guarantee that the study can be performed within the specified time frame. This research aimed to look at the effect of identified complexity factors on the timeliness of refurbishing projects. Potential solutions must be created to solve the problem of time performance in refurbishing projects. The research was restricted to a residential high-rise development project in Malaysia. This research does not include commercial high-rise buildings or residential landed properties.

This research will collect questionnaire data from Malaysian house buyers of high-rise residential development projects. The questionnaire respondents are a professional architect team with expertise managing high-rise residential construction projects in Malaysia. The findings of semi-structured interviews will be utilized to assess the customer satisfaction factor in a project from both the standpoint of a house buyer and an architect.

1.9 Significance of Study

The study's relevance is a written statement explaining why the research was necessary. It justifies the significance of your work and its influence on your study area, its contribution to new knowledge, and how others will benefit from it.

When writing this part, consider where the gaps in knowledge in your study subject are. What topics have little or no prior published literature and are thus poorly understood? Alternatively, what issues have others already reported that still need more research? This is often known as the problem statement.

A few significant benefits may be anticipated if this research is carried out. This research added to our understanding of poor customer satisfaction with architectural design when house buyers get their homes at the project completion stage. There are significant members of literature connected to the customer satisfaction factor on residential but only a few writing precisely the customer satisfaction factor to the high-rise residential building design requirements of a professional architect. The study's findings will likely aid professional architects and developers engaged in high-rise residential construction. Identifying the aspects that contribute to residential happiness is the first step in determining the best solution.

This study contributed in the following manner:

- This research investigated the factors influencing customer satisfaction in the architectural design of a high-rise residential project in Malaysia. This characteristic identified aided the professional architect in having greater control and direction of design requirements.
- This research would aid in defining the responsibilities of professional architects in controlling architectural design quality for high-rise residential buildings.

- An overview of factors influencing customer satisfaction based on architects working in high-rise residential development might give a broader perspective on the issues.
- This research might benefit academic institutions, professional architects, and developers by adding to the body of knowledge for producing a complete and correct architectural design in high-rise residential construction projects.

1.10 Structure of Thesis

1.10.1 Chapter 1: Introduction

Six chapters were included in this research. This chapter of the study will describe the research backdrop, problem statement, purpose, goals, research question, research technique, and the scope and importance of the investigation.

1.10.2 Chapter 2: Literature Review

This chapter's primary objective is to conduct a literature review. To ensure a thorough grasp of this research, all relevant studies from papers, books, the internet, and journals will be utilized as a reference or guideline to provide a theoretical foundation for it.

1.10.3 Chapter 3: Research methodology

Considering the research technique's benefits and disadvantages, the most appropriate research method will be identified and used for this study. Meanwhile, this chapter will discuss the many types of analytic applications.

1.10.4 Chapter 4: Research Findings

While chapter four will show and summarise all results in connection to hypotheses or research questions via tables and graphs. It typically comprises the research's facts and does not involve a great deal of analysis, which will be explored in more detail in the next chapter.

1.10.5 Chapter 5: Discussion

Chapter five will analyze and evaluate all results or data acquired, and qualitative explanations of phenomena will be provided. All analyzed data will be discussed in further detail. The limitations of the study will be identified and justified.

1.10.6 Chapter 6: Summary and Recommendations

A conclusion will be drawn based on the results. A few specific suggestions will be made for further research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

According to Kotler and Keller (2012), customer satisfaction research significantly influences the company. Many elements influence customer purchase decisions, but one of the most important is product quality. Dudoyskiy (2015) also claimed that this conduct results from their demands being met, which is why they acquire what they satisfy. Quality in Malaysia's building sector has already played a significant role in improving citizens' quality of life. As a result, it is vital to enhance the quality of building projects periodically.

2.2 Architect Role in Professional Project Team

According to Hussin and Omran (2009), a competent project team is required to effectively lead the whole project life cycle to create a high-quality project. From the project initiation stage, through the project planning stage, to the project implementation and execution stage, to the project performance and monitoring stage, and finally to the project conclusion stage. According to A. Serpell and L.F. Alarco' n (1998), project quality performance is one of the processes used throughout the building construction phase. This comprised the project planning process, such as site organization, the project execution process, correct material and equipment installation, and the project monitoring process, such as proper building component assembly. Anyanwu (2013) outlined a typical organizational chart that comprised several partners from the construction project team. The researcher devised a hierarchy chart to help stakeholders understand their rights and the significance of their responsibilities.

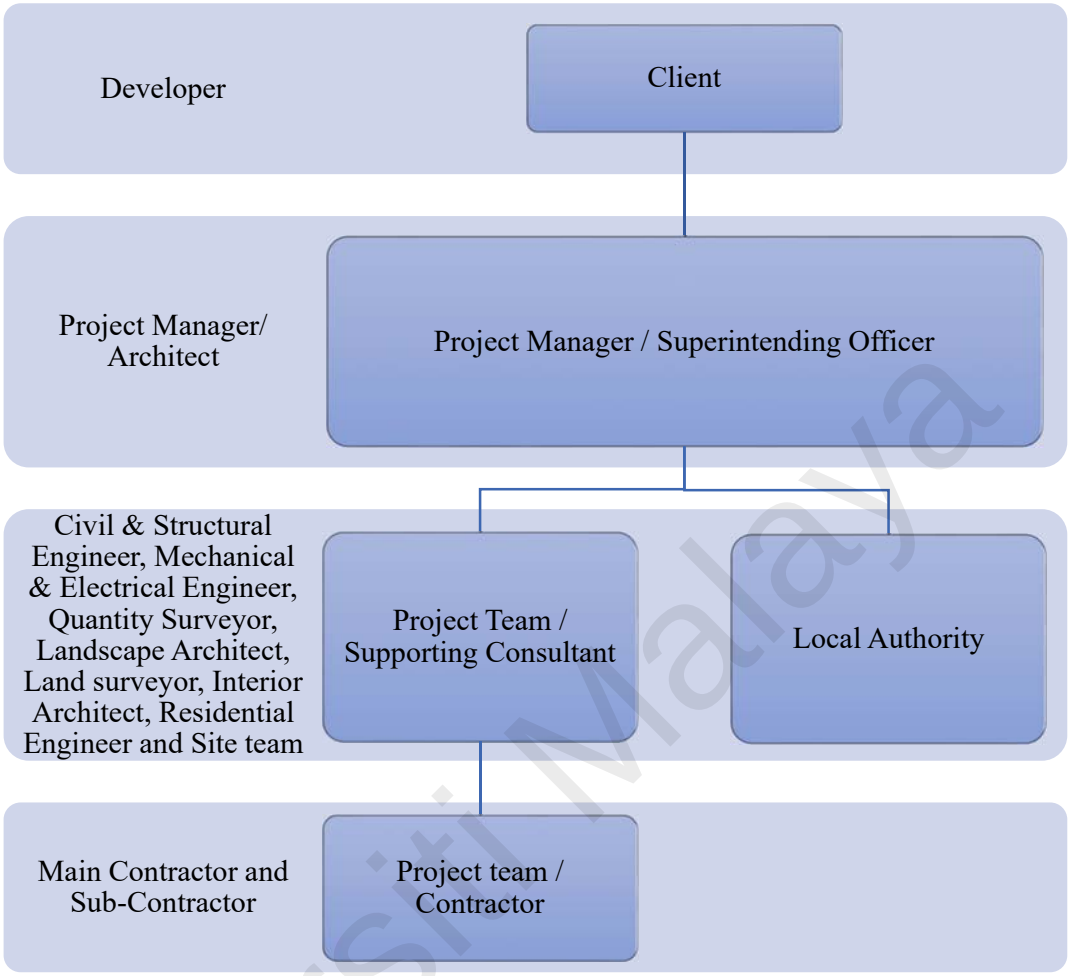


Figure 2.1. Project Team Organization Chart *(source: Anyanwu, 2013)*

2.3 Architect Role in Professional Design Team

According to D. Arditi and H.M. Gunaydin (1997), drawing quality and specification is also a determinant of the quality of a construction project. The structure is a 3D rendition of a 2D concept sketch. As a result, the quality of the drawings and specifications will impact not only the project execution stage, but also the construction stages until the project is completed. As a result, as Hussin and Omran suggested, a formal design team should be constituted (2009). According to Hussin and Omran (2009), the design team,

comprised the architect, surveyors, civil and structural engineers, mechanical and electrical engineers, quantity surveyors, landscape architects, and interior designers, typically created the drawings and specifications. The researcher produced a hierarchy chart to facilitate comprehension of the design team's decision-making structure.

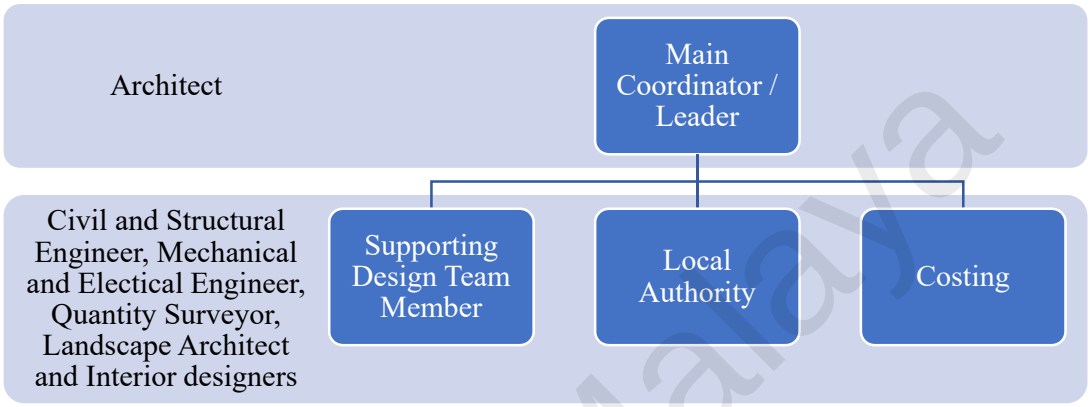


Figure 2.2. Professional Design Team Organization Chart

(source: Hussin & Omran, 2009)

According to J.M. Duncan, B. Thorpe, and P. Summer (1990), an improper specification on the design might result in an expensive mistake in the construction, hurting the project's quality performance. As a result, as stated by P. Dozzi, F. Hartman, N. Didsbury, and R. Ashrafi, the design team leader must coordinate with the design team members since all design team members come from diverse backgrounds and professionality (1996). According to D.H.T. Walker (1998), a solid coordination and communication design team will result in a high-quality drawing, minimizing design mistakes during the construction stage and allowing the project to be finished sooner.

2.4 The Architect

According to Figures 2.1 and 2.2, the architect has played a significant role in design and project management. An "Architect" must be a certified architect, according to Section 2 of the Architect Act of 1967. Furthermore, they should carry out their vocations in Malaysia. According to Anyanwu (2013), the architect is the main person who translates the client's vision and needs into an understandable form of visualization and drawings. According to Hussin and Omran (2009), the architect is also the primary person involved in the overall design, planning, and supervision of the building construction life cycle. They are most likely translating the user's requirements into client requirements.

2.4.1 Architect Roles in Managing Quality during Design Phase

According to Sullivan (1986), Quality Function Deployment is a concept or set of tools that translates client expectations into technical requirements acceptable for product or project development and production. Planning, analyzing, and designing a product/project, engineering, marketing strategies, prototype assessment, sales analysis and planning, manufacturing process and development, and so on are all product or project development stages. Professors Shigeru Mizuno and Yoji Akao created and pioneered this approach in Japan in the late 1960s and early 1970s. The goal of developing this methodology is to provide a quality assurance method that may aid in creating a customer satisfaction product during the product's early planning stage rather than after it has been made. According to Akao (1990, 1997), quality function deployment is most often employed in aerospace, automotive, and electronics. It also claimed that most of the companies mentioned above would prefer to employ quality function deployment to get

a better design and higher client satisfaction. By deploying the quality function at the building design stage, you reduce the project lift cycle and play a role in cross-functional communication to enhance the product and develop customer confidence. According to Gargione (1999), implementing quality function deployment in the construction industry is unique. Below are some examples to support his statement:

1. A quality function deployment was carried out during the refurbishment of a computer workroom (Mallon and Mulligan 1993)
2. After incorporating the customer's requirements into a housing component, the choice to manufacture outside structural wall panels is being made (Armacost et al., 1994)
3. The internal arrangement of a building department was established by design preferences (Serpell and Wagner, 1997).
4. According to Houvila et al. (1997), various participants are required to collaborate in the application of quality function deployment, including an architect, a structural design engineer, a civil engineer, a mechanical engineer, an electrical engineer, a landscape architect, an interior designer, and contractors, with the architect playing a critical role as the team's leader.

To capture and address clients' needs and requirements, the goals and features of the quality function deployment should be identified and discussed during the project planning stage. J. Archit. (1999) agreed that the customer's voice should be captured and incorporated into design and construction. It is critical to have a deeper understanding and traceability of the client's requirements, so the architect should be established to improve communication and integration among the design team members.

2.4.2 Roles in Managing Quality during the Planning Stage

According to Anyanwu (2013), the architect should engage in a design team at the project planning stage to provide particular professional services such as civil engineer, structural engineer, mechanical engineer, electrical engineer, landscape architect, etc. In addition, the quantity surveyor is part of the design team to aid the architect in developing a cost-limit and time-scaled project design for client approval. Anyanwu (2013) also said that the design team leader, the architect, should have finished the architectural drawing before passing it on to other design team members to contribute and input their expertise.

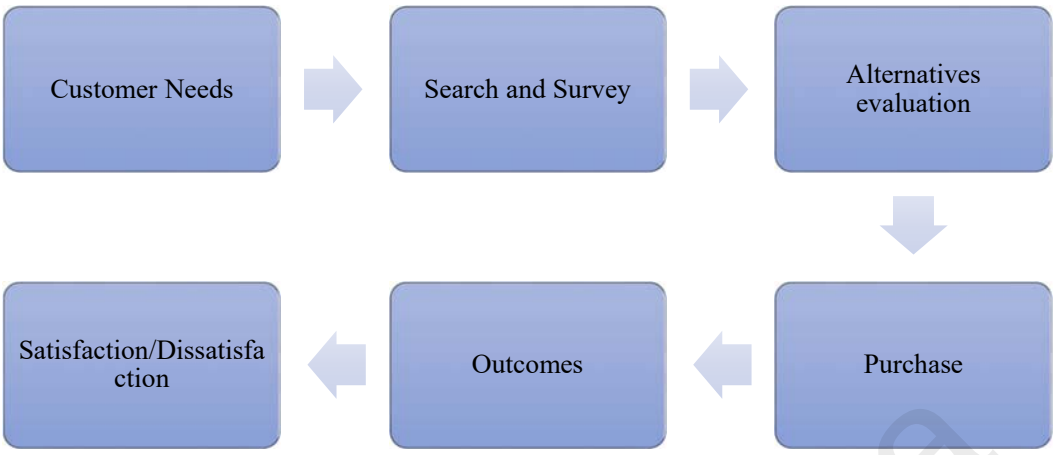
2.4.3 Roles in Managing Quality during the Construction Phase

According to Burr, Kevin L (2010), architects play an essential role in the success of a high-quality construction project because they must take responsibility and visit the site regularly to inspect the contractor's work to ensure it matches their architectural drawings and specifications. According to Ashokkumar (2014), this is a method of regulating the quality of the construction project. Its purpose is to monitor and assess if the contractor meets the required quality standards, such as tile layout, wall thickness, ceiling height, corridor width, and so on. It is also a method of determining the root reasons for poor performance. According to Simson and Atkins (2006), the architect should find and report nonconforming contractor work. He also added that work monitoring is one of the most critical components in ensuring the quality of construction projects. As a result, the professional might engage in two different partnerships. According to PAM 2006, the architect is explicitly defined as the project leader. They have direct interaction with /her respective consultants, the engineer, and the quantity

surveyor. The architect should use his most familiar and reasonable competence and effort to project management and quality control.

2.5 Customer Satisfaction

According to Cadotte (1987), client satisfaction is challenging to examine since what makes one customer happy may not make another happy. Personalities and requirements vary according to circumstance. As a result, customer satisfaction is defined as both an individualistic and situational assessment of diverse consumer purchase experiences. According to Foxall (1990), buy behavior models explain how consumers choose particular purchasing situations and how those choices are evaluated. Due to the model's several revisions during its lifespan, it is now referred to as the Engel, Blackwell, and Miniard model (1993). It comprises four significant components: the decision process, the input, the information processing, and the decision process variables. Although it is a sophisticated model, the decision process serves as the central theme of behavior, with the other portions functioning as peripheral inputs to this significant process. Consequently, the decision-making process is a point of contention, as seen in the figure below.

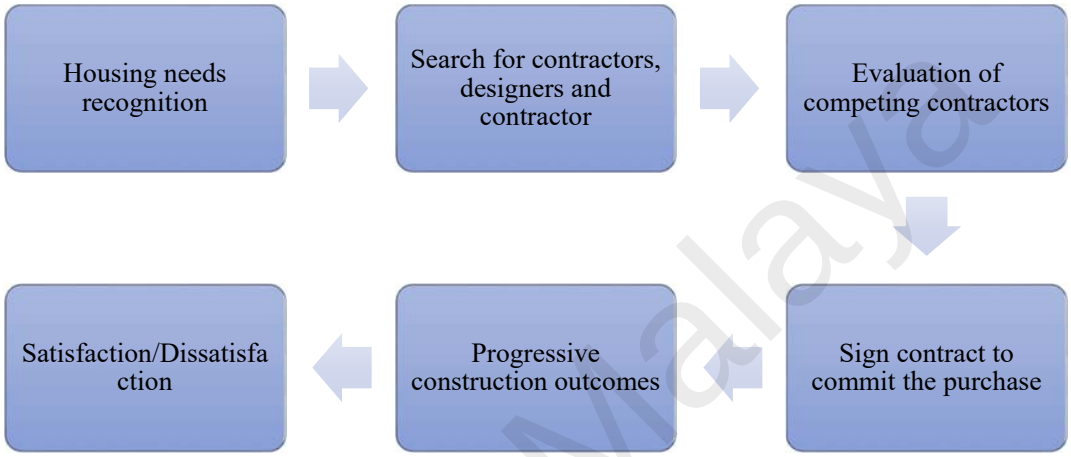


The purchase decision process from the Miniard model of customer behavior

(source: Engel et al., 1993, p. 53)

From the client's perspective, John Forsythe (2007) adapted the Engel, Balckwell, and Miniard model of consumer behavior to suit house construction. The picture below summarises the prior discussion by adding inputs to the vital purchase decision points and correctly modifying terminology. According to contemporary customer satisfaction research, the primary determinants of satisfaction are product and service performance and customers' expectations for that performance (Swan and Combs 1976; Johnson and Fornell 1991; Barsky and Labagh 1992; Anderson et al. 1994). According to that paradigm, when a buyer purchases a product or service, he or she creates expectations about the item's future performance. As the customer organizes the product/service, they evaluate its performance against their expectations. The customer will be satisfied if the product/service performs as expected or better. However, dissatisfaction will develop if performance falls short of expectations. According to Swan and Combs (1975), an organization must assess customer satisfaction regularly to ascertain how satisfied its customers are. Perry According to John Forsythe (2007), the amount of client satisfaction, or dissatisfaction, in construction, is often unclear until the project is

completed and the bulk of the customer's money has been spent. He continued by stating that there are no commonly accepted criteria for determining customer satisfaction in the construction industry.



The home buyer purchase decision process from Engel (1993).

(source: Perry John Forsythe, 2007)

According to Tom Alby (2017), all projects start with the best of intentions. Customers are at the center of project management activities, and as such, they are involved from the start (requirements collecting) until the completion (delivering products and services). This is why project architects include client delight into their planning at all times. As defined by Tom Alby (2017), customer satisfaction is all about comprehending, defining, analyzing, and managing client demands to meet their expectations. This concept involves adhering to the criteria to ensure that the project accomplishes its objective. According to Johnson and Fornell (1991), client satisfaction is a component of project quality management in project management. It ensures that the project's policies, objectives, and responsibilities are acceptable to all project participants.

According to Tom Alby (2017), the project architect should also arrange surveys and assess the outcomes based on the responses supplied by their customers through helpdesk, monitoring repeat purchases, social network involvement, and even online attitude tracking. Anderson et al. (1994) provided the following advantages to back up their claim: (1) allows project architects to know if they are meeting customer expectations, (2) identifies customers and develops more ways to retain them, (3) develops a system to reward an internal organization that contributes to a high customer satisfaction rate, and (4) tracks processes and strategies that help achieve customer satisfaction and sets them for fine-tuning.

Construction factors include practical, aesthetic, financial (cost), and schedule constraints (BARRETT 2000). Customer pleasure may be expressed in the housing industry via factors such as house design, unit quality, and property maintenance (TORBICA et al. 2001). The essential components that contribute to overall quality are as follows (KRN 2004): (1) the plan's quality (idea), (2) the materials' and technology's quality, (3) the processes' quality (functional quality), and (4) the product's or service's quality after the sale (technical quality).

Three key factors determine the quality of building construction: the quality of the construction work (40 percent), the quality of the architectural work (50 percent), and the quality of the external work (50 percent) (10 percent) ENGLISH (2001)

Additionally, quality covers two distinct perspectives: the absence of defects and the sense of perfection (RONDEAU et al. 2006). The criteria for products, labour, and services are frequently specified in terms of customer desires, aspirations, and expectations. Notably, a high-quality construction product, such as a unit, must adhere to construction standards, design quality standards, structural design, effective building

process management, and product and material quality requirements (HSIEH et al., 2006).

2.6 House floor plan design

According to Osanloo, A., and Grant, C. (2016), a floor plan outlines the internal elements of a home's construction. This sketch shows the floor layout as if the observer were gazing down from above into the house itself. Rooms, doors, toilets, a kitchen, ventilation, electrical outlets, and an appealing design are common characteristics in all residences. However, the architectural option made in the elevation sketch will determine how each house is arranged or set out.

According to the United Nations (United Nations, 1977), a home design is the quality of the house layout in terms of generalized and allocation of living space regions relevant to the fundamental duties required of a family, which are space planning and function. Typically, this kind of layout is generalized to determine the quality of a property. Caudill (1978) stated that an appropriate layout must always meet existing and future expectations. Such requirements should be evaluated based on their quality rather than the cost, size, and structure of the physical environment with which people interact. Consequently, the living environment that man creates via house design must meet a particular set of requirements. Design adequacy needs the designer's ability to link all necessary elements in stated and straightforward ways.

According to (Khajehzadeh & Vale, 2016c; Khajehzadeh et al., 2016), most of these enormous residences' generalized rooms and sanitary areas are seldom generalized. Furthermore, another section of this research (Khajehzadeh & Vale, 2016b) shows that individuals do not leave extra rooms in big homes unoccupied but rather fill them with

more furniture and appliances. Given the latter's limited usable life, the energy effect of living in bigger dwellings is significant for housing sustainability.

According to Khajehzadeh, Iman, and Brenda Vale (2017), the design of a house on paper may change significantly throughout construction and occupancy for several reasons, including poor design, disregard for customer demands and personal preferences. Individuals may alter the design of their houses to adapt to changing lifestyles or to meet new requirements.

While little study and information exist about how people adapt and use their homes (Leah, 2015), there is also a shortage of knowledge regarding how house features have developed in terms of size and design. Such knowledge may aid architects, builders, and developers gain a better understanding of what clients want and desire.
According to Mohammad (2010), housing comes in various shapes, sizes, and designs. Still, regardless of its form, it must be evaluated for quality to ensure that it meets the resident's familial and cultural requirements.

Husna and Nurijan (1987) observed that, although residents of low-cost public housing in Kuala Lumpur, Malaysia, were happy with the services given by city hall workers and neighborhood aspects, a sizable majority were dissatisfied with the characteristics of their housing units. According to Nurizan (1993), residents of low-cost housing in Johor Bahru were satisfied with public transit and the housing's proximity to the city, but not with the home's size, which contributed to congestion.

There are also indications that bigger homes feature more than one living room. According to US Census Bureau research (Sarkar, 2011), the proportion of residences

with two or more living rooms climbed from 3.1 percent in the 1960s and earlier to 6.1 percent in 2005–2009. According to Vale and Vale (2009), the single living room of an early twentieth-century home in the UK had a space of 12 m2 and various purposes for cooking, dining, and resting. Still, each of these activities may occur in a distinct room in modern dwellings. They also emphasize the prevalence of formal and informal living spaces in contemporary homes. The single multi-purpose area in earlier buildings seems to have been divided into multiple generalized sections in more prominent contemporary residences.

According to Khajehzadeh, Iman, Vale, Brenda (2017), knowledge regarding the characteristics of homes and how they vary with size seems to be particularly significant for architects and others engaged in the development of residential structures. Aside from that, it is essential to understand how people general the spaces in their homes. Bringing this information together might assist designers and builders in making better judgments about the features and layout of future homes. When it comes to the influence of home size on resource consumption, bigger houses consume more natural resources since certain places, such as bathrooms, need more help in their fittings and piping than, for example, a bedroom. Before trying any generalized resource accounting using a method like life-cycle analysis, it is thus critical to understanding how housing size influences the entire plan. Furthermore, (Baeissa & Hassan, 2005) mentioned that the internal space layout of this Shibami home is structured based on the space-function design for customer use.

Additionally, according to Dynamic Room (2008), Amana (2010), and Edic (1999), the kitchen is the most often renovated space in a house, making it the most costly in terms of design. Additionally, Harbor, B. (2009) and Yazi (2014a and 2014b) said that the

kitchen is critical for a designer to handle in almost all projects. According to Yazcolu, D. A., and Kanolu, A. (2016), achieving a high-performance kitchen design requires designing solutions tailored to the customer's demands who will use the kitchen.

According to API (2020), well-designed toilets are vital for user privacy, essential criteria, and functionality, which is equally crucial for bathroom design. According to API (2020), architects and designers for high-end firms or restaurants concentrate on consistency across their facility, including bathroom décor. For example, it might include unique materials and high-quality finishes from the reception and dining rooms to create a sumptuous design that improves the whole client experience. Furthermore, O'Reilly et al. (2017) and Rashid & Pandit (2017) stated that different toilet options are designed with the attributes that define the technical specifications of the toilet structure in mind while ignoring the details related to the availability of water and toilet maintenance that are required for its long-term use. Husna and Nurijan (1987) conducted the first study of residential satisfaction among public low-cost flat dwellers in Kuala Lumpur and discovered that 41% of respondents were dissatisfied with the characteristics of their dwelling units, 85% desired a dining space, and 82% preferred a separate bathroom and toilet in their dwelling units. Malaysian low-cost housing designs have recently developed from two to three bedrooms, including a dining area, a separate bathroom and toilet, and a drying place (CIDB, 1998).

According to M.Nikravan Mofrad (2013), differences in floor-to-ceiling height on human comfort in particular information or thermal environment have been studied. Additionally, M. Nikravan Mofrad (2013) conducted tests in a laboratory equipped with an adjustable roof height. The findings indicate that the optimal floor–to–ceiling height for typical residential urban apartments is between 2700mm and 2800mm. Additionally,

M. Nikravan Mofrad (2013) stated that if the floor–to–ceiling height is less than or greater than a specified value, it affects economic issues, building maintenance, adherence to architectural size ratios, structural and earthquake calculations, material quantities, building component and appliance standards, cleaning, prefabrication, industrial production, and mass production, among others. Consequently, M.Nikravan Mofrad (2013) noted that the designer's viewpoint and degree of satisfaction with living spaces might aid in adopting necessary steps toward accurate distance specification.

According to Maria (2013), customer satisfaction in the electrical power supply industry is a multidisciplinary topic that can be approached from three perspectives: customer satisfaction from a marketing standpoint, service operations from an operations management standpoint, and energy supply service based on the infrastructure of electric power systems. An uncontrolled rise in energy consumption is also projected in the future due to growing population growth, the need for greater comfort levels, and the amount of time spent inside (Iwaro and Mwasha, 2010). As a result, energy consumption must be reduced. Everyone must adopt energy sustainability, taking into account indoor air quality, thermal comfort of occupants, and, most significantly, a decrease in greenhouse gas emissions. Although energy-efficient cooling solutions have been introduced to lessen reliance on nonrenewable energy, these measures cannot eradicate carbon emissions. As a result, natural ventilation should be considered since it has been shown to have a high potential for providing appropriate thermal comfort in both tropical and temperate areas (Haase and Amato, 2009). Numerous researches on occupants' ventilation behavior in residential structures have been done in light of natural ventilation's potential benefits (Johnson and Long, 2005; Fabi et al., 2012; Frontczak et al., 2012; Lee et al., 2012). For instance, Frontczak et al. (2012) observed

in a study of Danish households that occupants preferred natural ventilation over mechanical ventilation to give interior fresh air via increased window openings. Additionally, natural ventilation facilities in Malaysian residential structures are controlled by the 1984 Uniform Construction By-Laws (UBBL), enacted to provide a consistent building code for the whole country and apply to all local governments and building professionals (Laws of Malaysia, 2008). UBBL law 39 (1) states that "*Every room designed, adapted or used for residential...shall be provided with natural lighting and ventilation using one or more windows having a total area of not less than 10% of the clear floor area of such room and shall have openings capable of allowing a free, uninterrupted passage of air not less than 5% of such floor area*." However, research (Hanafiah, 2005; Ahmad et al., 2011) has shown that this rule was sometimes ignored, implying that there were instances where residential buildings built in Malaysia were designed with inadequate apertures for optimum day lighting natural ventilation. Most people prefer a daylit environment because sunlight provides a well-balanced color spectrum with a bit of peak in the visible blue-green area (Liberman 1991). (1991, Liberman.) According to Hathaway et al. (1992), natural light also contains the most significant amount of light required for biological functioning. The various light spectrums affect both the mental and physical health of people. These are the advantages of daylighting that are less quantified and sometimes disregarded. Daylighting has been associated with better mood, morale, decreased weariness, and less eye strain. According to Dr. Khaled Al Omari (2016), natural illumination influences an occupant's behavior.

Additionally, various factors like visual comfort, thermal comfort, and natural ventilation significantly influence how and why occupants behave in specific ways. As a result, significant steps must be taken to increase the efficiency of spaces to enhance the user experience in a pleasant environment and connect the area of the opening to

specific control to ensure that each user receives the amount of natural light necessary to influence their behavior positively. Dr. Khaled Al Omari (2016) examined the association between occupant happiness and the quantity of natural light in the living room. According to the occupant happiness research findings and the lighting measurements for the living room sections, the illumination value does not fulfill the fundamental occupant satisfaction standards.

According to Sulaiman, Jusoh, Ying, and Soheilirad (2019), adherence to the QLASSIC standard by the developer to assure homebuyer satisfaction with the quality of the finished house. Based on the reviews of Che Ani et al. (2014), I. Ismail et al. (2012), and Mohd Fauzi S.N.F et al. (2012), the following variables on construction quality and customer satisfaction may be identified. Those factors are: -

a) Improving building quality directly influences customer satisfaction since there is a high link between quality and customer satisfaction. Fewer flaws will result in happier customers.

b) Previous assessments have pointed to a few general characteristics in Malaysian building sectors to enhance construction quality. For example, Che Ani et al. (2014) mentions architectural finish, whereas I. Ismail et al. (2012) mention cracking defect, crack, moisture, peeling off, painting defect, rust, and rot. Architecture finishes are part of the CONQUAS / QLASSIC evaluation, and the better results will translate to higher customer satisfaction with the quality. Also, in prior research, there was a study on consumer satisfaction concerning aspects listed in QLASSIC and CONQUAS, and the rating was only at the average satisfaction level. However, no correlation analysis has been conducted to link this to QLASSIC element accomplishment or how CONQUAS and QLASSIC fared customer satisfaction. It was also noticed that CONQUAS is a more familiar instrument used by Malaysian property developers; nevertheless, no

research has attempted to correlate the investment against the return to fulfill entire customer satisfaction.

2.7 Project design

According to (Xu, 1987), low-rise or mid-rise buildings can be connected and arranged horizontally, resulting in ground-friendly and appropriately sized outside public and semi-public space in front of the buildings; however, high-rise buildings must be constructed separately due to their mass, solar requirements, and ventilation requirements, resulting in the same energetic outdoor spaces as seen in low-rise or mid-rise buildings (Xu, 1987).

According to Hwai (2021), lobby design is where operators concentrate their efforts. Because the main lobby is where a resident gets their first impression of a building's brand image and quality. Including relevant design criteria into the main lobby, design is a value creation act that might improve the building's branding and marketing and keep it competitive. Lobbies serve as a gathering place for customers to relax and meet guests (Collins, 2001). One of the most significant roles of a lobby is to act as the primary circulation zone, leading customers to different sections of the building (Rutes, Penner, & Adams, 2001). There is a tendency toward more significant lobby areas in the affordable and midscale sectors (Worcester, 2000).

According to Nataljia (2016), one of the primary challenges associated with poor functional quality in residential buildings that contributes to lower resident satisfaction levels is restricted access. Additionally, she said that most house purchasers would be content with accessibility, most likely because they had already chosen and acclimated to the location of their future home when considering acquiring a property. People are

often unsatisfied with an area due to the lack of public transportation and the reliance on automobiles to get to their homes. Transportation accessibility, defined as the ease with which one may reach a destination through a transportation system (Morris et al., 1979), has been shown to significantly affect subjective well-being (Delbosc, 2012; Churchill & Smyth, 2019). However, it is uncertain if transportation accessibility affects home satisfaction. While some studies found that residents who live closer to highways are equally satisfied as those who live farther away (Hamersma et al., 2014; Hamersma et al., 2015), others found that residents who travel less to the nearest bus stop (Abe & Kato, 2017) or who live closer to light rail transit, bus stations, or taxis (Mohit et al., 2010) are more likely to report higher levels of residential satisfaction. Transportation accessibility's impact on moving intention may be primarily influenced by whether it has a substantial direct effect on residential satisfaction, which may affect moving purpose indirectly, or a significant immediate impact on moving intention. Home pleasure serves as a conduit between residential features and moving purposes in the first scenario (Rossi, 1955; Speare, 1974; Morris et al., 1976). Residents are not anticipated to relocate to a more desirable dwelling or location as long as the impact of transportation accessibility is less than the combined influence of all other residential qualities. Residential satisfaction does not mediate between transit accessibility and desire to move in the second situation. Independent of the residence's qualities, a lack of transit accessibility may result in decreased residential mobility (Landale & Guest, 1985). According to O'Herlihy Access Consultancy (2011), accessibility is influenced by factors other than the structure's architecture. It is vital to understand how the daily administration of a building affects the ease with which people may access and emphasize its services. Additionally, it is essential to ensure that appropriate management and maintenance policies and procedures include accessibility.

According to M.A. Mohit (2010), public amenities have a significant effect in determining the quality of housing and should be included in the calculation of residential satisfaction. This component consists of the following variables: open space, play area, parking, prayer and multi-purpose rooms, perimeter roads, pedestrian pathways, public phones, neighborhood businesses, and food sellers. Additionally, M.A. Mohit (2010) stated that neighborhood facilities influence residential satisfaction in a variety of ways, as they refer to the location of the housing area concerning the workplace and other amenities, such as distances to the town center, school, police station, hospital, market, shopping centers, public library, religious building, LRT, bus, and taxi station. According to Gottlieb (1995), home amenities are "the point when a resident user's unique goods or services enter utility functions." The primary rationale for emphasizing the role of urban amenities in urban intensification implementation is consistently emphasized in the literature. According to Ho-Jeong Kim and Mi-Ran Yang (2017), the most significant factors determining residential satisfaction in decreasing order were amenity, neighborhood, and safety, with amenity and safety showing a strong correlation. The amenity component was substantially related to the quality of transition areas between individual dwellings and urban space, while the neighborhood element was strongly related to community awareness.

Djebuarni and Al-Abed (2000) revealed that residents of public low-income housing in Sana'a, Yemen, put a high premium on neighborhood satisfaction, particularly privacy, which they believe reflects Yemeni society's cultural history. While housing is likely to provide satisfaction, neighborhood factors such as crime (Mullins, Western, & Broadbent, 2001), a lack of amenities (Fried, 1982), industrial development, or work location are likely to bring unhappiness. While the initial review of studies on residential satisfaction indicates that various housing, neighborhood, and household

characteristics influence residential satisfaction, the effects of these variables as determinants of residential satisfaction or dissatisfaction vary by housing type, tenure, country, and culture, implying that additional research/studies are needed to determine residential satisfaction on an individual basis.

According to Faridah (2005), planning for security and safety contributes to designing a sustainable structure. Regardless of the degree of protection, security and safety measures must be evaluated within the context of the whole project, including the effects on inhabitants and the environment. Faridah (2015) also said that design experts in high-rise structures must be mindful of safety and security problems, particularly from the design, operational, and liability perspectives in the case of a hazard or natural catastrophe. She also said that combining safety, security, and sustainability goals result in creative and balanced design solutions that reduce environmental consequences while protecting building inhabitants' health, safety, and comfort.

According to Tan (2011a), there is a rising appreciation for the advantages of gated communities. Additionally, among Malaysian house buyers, a gated housing community is one of the top five criteria for purchasing a property (Aruna, 2013). The majority of prior research indicates that homeowners choose gated communities out of fear of crime and violence, primarily to create a safer atmosphere (Cséfalvay, 2010; Grant, 2005; Blakely and Snyder, 1998). According to Górczyska (2012), household worries motivate living in a gated community. Around 70% of Americans have migrated to a gated community due to security concerns (Sakip and Abdullah, 2012). Due to the fear of crime, gated home developments have perimeter gates and walls and 24-hour security patrols and installed CCTVs to restrict outsider access. According to Osmanet al.(2007), all gated enclaves have two critical security characteristics. The first is security and safety equipment such as closed-circuit television cameras, intercom

systems, alarm systems, and surveillance systems. These gadgets are used to monitor who enters and departs private property. The second part of security is patrol services provided by security guards. At the gated neighborhood's entrance, security officers are often stationed to prevent outsider access and to let only residents or visitors with permission enter.

Additionally, it is said that living in a gated community provides security for one's family and oneself in the case of an undesired intrusion (Adnanet al., 2014). Tan (2011a) conducted research in which Malaysians who live in gated communities said that security concerns are the primary reason for doing so. To some extent, walls and gates contribute to social order by monitoring security and separating the privileged from those considered dangerous (Clement and Grant, 2012; Leisch, 2002). Finally, Teck hong tan (2016) revealed that respondents were most satisfied with features related to the safety and security of their homes. This includes the security guards at the main entrance, the perimeter fence, and the home alarm system.

According to Faridah (2005), the primary objectives of sustainable design are to avoid resource depletion in energy, water, and raw materials, prevent environmental damage caused by buildings and facilities throughout their lives, and create livable, healthy, and productive building environments. A sustainable building design seeks to maximize site potential, reduce energy consumption, save and save water, use environmentally preferable materials, enhance indoor environmental quality (IE), and optimize operations and maintenance procedures. The designers must provide a workable solution that meets density, space, and sustainability concerns.

Performance-based design is a concept that focuses on the performance objectives specified by the user. Szigeti Szigeti Szigeti Szigeti Sziget (2005). In essence, performance goals may change according to the perspectives of important stakeholders.

The performance of a building and the requirements of its users/occupants are closely related. Gopikrishnan and Paul (2017) classified building user/occupant requirements into three categories: physical performance associated with the physical condition of the building, functional performance related to occupant health, and financial performance related to capital costs or building life cycle expenses. Sayn and Elebi (2020) added social and process performance to this. Consequently, by identifying performance targets at the outset of the design process, the designer's efforts will be concentrated on areas where performance may be improved.

According to Held (1996), famous structures are primarily constructed to be aesthetically appealing before being utilized for their intended purpose. This is the primary motivator for the architect to improve its symbolic image. He also remarked that famous structures influence the community and the environment in which they are built by leaving a lasting impression on all visitors. According to Khaled et al. (2020), an iconic structure should have high-quality features and possess a distinct personality sensitive to its surroundings. The location, height, massing, materials, features, and facades of the building should inspire a vision for its identity and character to provide an aesthetically pleasing and physically developed structure. According to B.M Planning (2006), it is not enough to quantify and improve the factors that attract residents and visitors to a design. According to P.F. PPS (2009), the iconic structure should be built to fulfill residents' and visitors' needs and desires.

As a consequence, iconic buildings must develop throughout time to accommodate new uses. While customer contentment cannot be guaranteed instantly, addressing their requests in every situation ensures speedy outcomes. Iconic buildings may serve as a trigger in this instance.

2.8 Architectural services

The client is the owner of a construction project who engages an architect to do architectural work. Thus, client satisfaction is defined as the owner's assessment of the architectural services provided (Bear et al., 1999). Earlier studies in the building industry examined numerous aspects of satisfaction. Customer satisfaction (Torbica and Stroh, 2001), tenant satisfaction (Liu, 1999), contractor satisfaction (Soetanto and Proverbs, 2002), project manager/team satisfaction (Soetanto et al., 2001; Leunget al., 2004), and client satisfaction are all instances of these (Target al.,2003). These studies indicate that customers in the construction industry evaluate service satisfaction in several ways. This is most likely due to socioeconomic class and professional background differences among customers in this sector. As a result, a thorough understanding of the factors that contribute to client satisfaction enables architects to position themselves appropriately to provide more acceptable services, enhancing their possibilities for employment.

Another significant aspect influencing client satisfaction in the professional service industry is the service provider's reputation. The reputation of a business is described as its corporate image. Araloyin and Olatoye (2011) investigated the factors contributing to exceptional service in real estate companies. That study revealed that the most critical factor affecting customers' satisfaction with real estate agents' services was the agent's reputation, defined as the opinion a person has about an agent based on what others say about their earlier performance. Similar findings have been reported for professional businesses such as auditing firms (Cameranet al., 2010) and accounting firms (Aga and Safakli, 2007). The previous study indicates that customer pleasure or happiness directly affects consumer loyalty (Dick and Basu 1994). Customer loyalty is not always

just motivated by pleasure. At the same time, satisfied customers are indeed associated with dedication.

After consuming a product or service, satisfaction occurs due to the product's actual and projected usefulness (Khokhar et al., 2011). Due to the unique characteristics of each client, including their buying patterns, trends, needs, and wants, as well as their degree of satisfaction, it isn't easy to anticipate which product or service will please a particular group of customers (Maiyaki et al., 2011). Satisfaction and customer loyalty are positively correlated, which boosts an organization's chances of long-term survival. Divisions of marketing and management are intricately intertwined (Ahmed et al., 2010).

Trust is defined as the confidence of one party that the other will satisfy their wants and aspirations. In the context of services, trust refers to customers' confidence in the ability of the service provider to meet their needs. In general, a trust may be defined as a party's confidence in another based on the other partner's honesty and reliability (Morgan & Hunt, 1994). This concept might be used in various contexts, including commodity and service trading. Doney and Cannon (1997) assert that trust comprises two components: perceived credibility and compassion.

According to Leo A Daly (2021), the quality assurance/quality control plan ensures that all services, studies, designs, calculations, drawings, and specifications requested by the client are performed and delivered on time and following applicable professional architectural and engineering quality standards. The project's scope is reviewed during kickoff, and work is planned and scheduled. The members of the design team are assigned their responsibilities. This is the stage at which the quality assurance/quality

control process starts to take form. Systems coordination happens continuously throughout the schematic/conceptual design phase through design-team meetings.

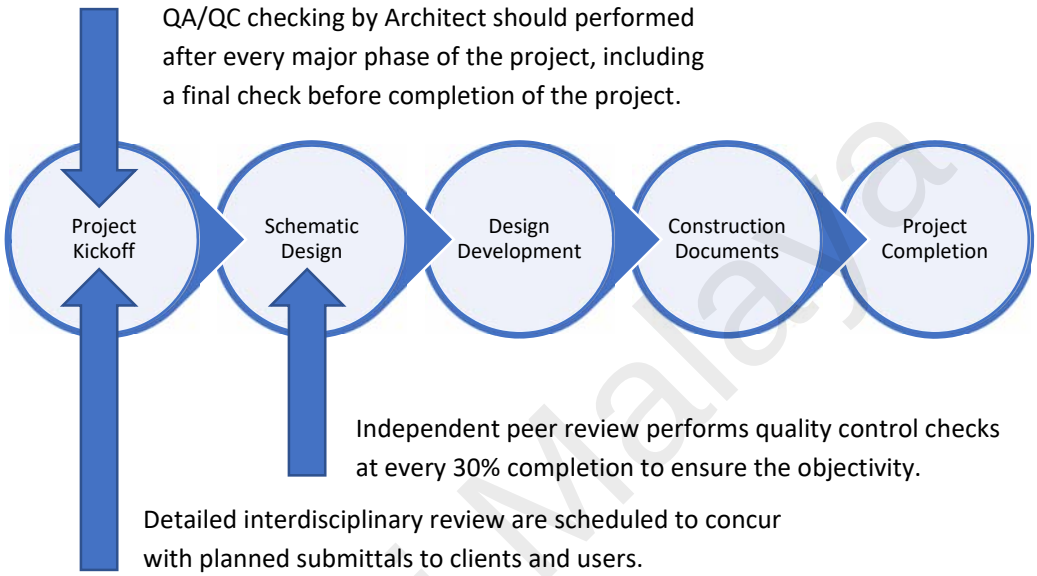


Figure 2.3: Architect Quality Control Procedures During a project

(*source: Leo A Daly, 2021*)

According to Bonaiuto (2004), the quality of people's homes is a critical factor affecting their overall quality of life. However, it ranks lower (in importance) than leisure activities, economic situations, work, friendships, and marriage/family life. According to Bonaiuto (2004), residential satisfaction may be described as an overall assessment of the residential environment from the perspective of the occupants. It may be defined as the pleasure or happiness associated with living in a particular area, i.e., the overall assessment that people make of their housing, which can be quantified on different scales (e.g., house, building, neighborhood).

Façade (or enclosure) systems and their related design, engineering, and construction are among the most time-consuming parts of a building project, having a substantial impact on construction and maintenance costs (Oliveira and Melhado, 2011). The unique architectural form of a structure often necessitates custom-made façade components, especially in tall construction projects. These various components need meticulous attention to detail during design and installation to ensure that their combined performance meets the system's behavioral requirements. The purpose of establishing many review and approval stages throughout the design and production processes is to raise the focus on completion (Tzortzopoulos and Formoso 1999). QAQC procedures serve as performance indicators (Tzortzopoulos and Formoso 1999). With this QAQC strategy in place, all stakeholders must collaborate more closely and quickly to ensure that the building enclosure can be created as intended while meeting aesthetic and performance objectives.

On the other hand, A. Griffith (1990) said that one of the primary critical elements that always affects the quality of construction projects on sites is a lack of oversight on low-quality labor tasks. Construction flaws are a typical occurrence in the business nowadays (Josephson (1999), Pheng (2001), Chong (2005), Haryati (2005)). (2010). It happens during the operating period of a structure and before and during the construction stage (Lateef, 2010). (Kian, 2001). Failure to rectify problems nearly always results in increased rectification costs, restricted building operation, and decreased service life. Defects may result in accidents and catastrophes (Grobler, 2002). According to Pheng (2001), Lateef (2010), and Kian (2001), construction faults may be defined as a failure or deficit in the building's function, performance, compliance with statutory or user requirements. They can manifest themselves in the structure, fabric, services, or other facilities. There are two sorts of flaws: patent and latent. Patent faults

may be readily recognized during construction and the project's Faults Liability Period (DLP). Meanwhile, hidden issues often manifest themselves over time once the facility is occupied. Several architectural faults exist and are likely to recur in numerous projects. Most defects result from poor workmanship due to poor work quality, a lack of control, and installation or protection procedures throughout the construction stage. This is further verified by the words (Ilozor, 2004) and (Ilozor, 2005). (Ahzahar). Inadequate design planning and material selection at the design stage result in design defects. As previously mentioned, material defects are produced mainly by using defective materials during the structure's construction (Chong, 2005). It has been shown that material flaws often do not manifest themselves until the occupation stage.

Numerous studies confirmed the incidence of design alterations and their cumulative negative impact on project performance (Han et al., 2012; Gde Agung Yana et al., 2015; Peansupap and Cheang, 2015; Yap and Skitmore, 2017, Yap et al., 2017). However, the factors contributing to the cost and schedule increases associated with design adjustments are not well examined (Chang, 2002). According to Chang (2002), recognizing the reasons is often the first step toward addressing a problem, followed by considering corrective action (Chang, 2002).

When changes are made to the design or requirements, design modifications occur (Burati et al. 1992). According to Abdul-Rahman et al. (2016), design modifications are "frequent additions, omissions, and changes to both design and construction work in a construction project that occur after contract award, affecting contract clauses and work conditions that contribute to the dynamic and unstable nature of construction."

Chang et al. (2011) observed that design alterations occur for three reasons: those under the owner's control, those in the designers' control, and those beyond their control. Peansupap and Cheang (2015) observed that the most critical change concerns in project cost disputes originate primarily from the owner. This finding corroborates the findings of Gde Agung Yana et al. (2015) and Mohamad (2012) that the owner is the most critical factor influencing the frequency of design adjustments. This is consistent with Mohammad et al.'s (2010) .'s claim that the significant source of modification orders in construction projects is the owner. Similarly, Hwang et al. (2014) observed that the client was the primary rework source.

On the other hand, Yap et al. (2016) said that several studies indicate that client-related changes significantly impact project performance. Several academics from various disciplines have identified numerous explanations for design revisions (Mohamad et al., 2012). According to Nurul (2018), ten typical reasons for design revisions include:

a) modification of the requirement/specification,
b) addition/omission of scope,
c) slow decision-making,
d) unclear initial design brief,
e) lack of coordination among,
f) design discrepancies,
g) design omission/incompleteness,
h) inexperienced consultant,
i) unforeseen ground condition, and
j) changes in government regulations and laws.

Prior research has identified design errors or inconsistencies and design omissions as common causes of design adjustments. Due to the intricacy of the design, discrepancies at project interfaces are possible (Arain et al. 2004). Inconsistencies at the interface

between design and construction might emerge due to interpretation challenges caused by preliminary drawings and specifications (Al-Hazmi, 1987). According to Sung and Meng (2009), human error from architects, structural engineers, and building services engineers may result in design mistakes and omissions. Unaddressed design problems may eventually present themselves during the construction phase, with potentially more severe effects than during the design phase (Chappell and Willis, 1996). Additionally, increased customer expectations for project completion on a timely basis have been identified as a significant factor in producing insufficient and erroneous contract documentation (Love et al. 2004).

A previously published study identified a lack of communication among consultants as another significant factor influencing design alterations. Coordination is critical in a multi-party environment, such as the one seen in most construction projects (Al-Hazmi, 1987; Clough and Sears, 1994). Inadequate coordination between stakeholders may result in disagreements that negatively affect the project (Arain et al. 2004). Mutual respect is critical for effective project coordination since participants weigh all options and points of view in the context of the entire project (Arain et al., 2004). Additionally, coordination and cooperation between parties are necessary, especially when unusual designs and technologies are used, to minimize inconsistencies (Arain et al., 2004). Consequently, successful project execution requires good coordination among all relevant parties (Sung and Meng, 2009).

2.9 Summary of Literature Review

A summary diagram is conducted with each citation for an easier understanding from the comprehensive literature review.

2.9.1 Summary of Customer Satisfaction factor to House Unit Design

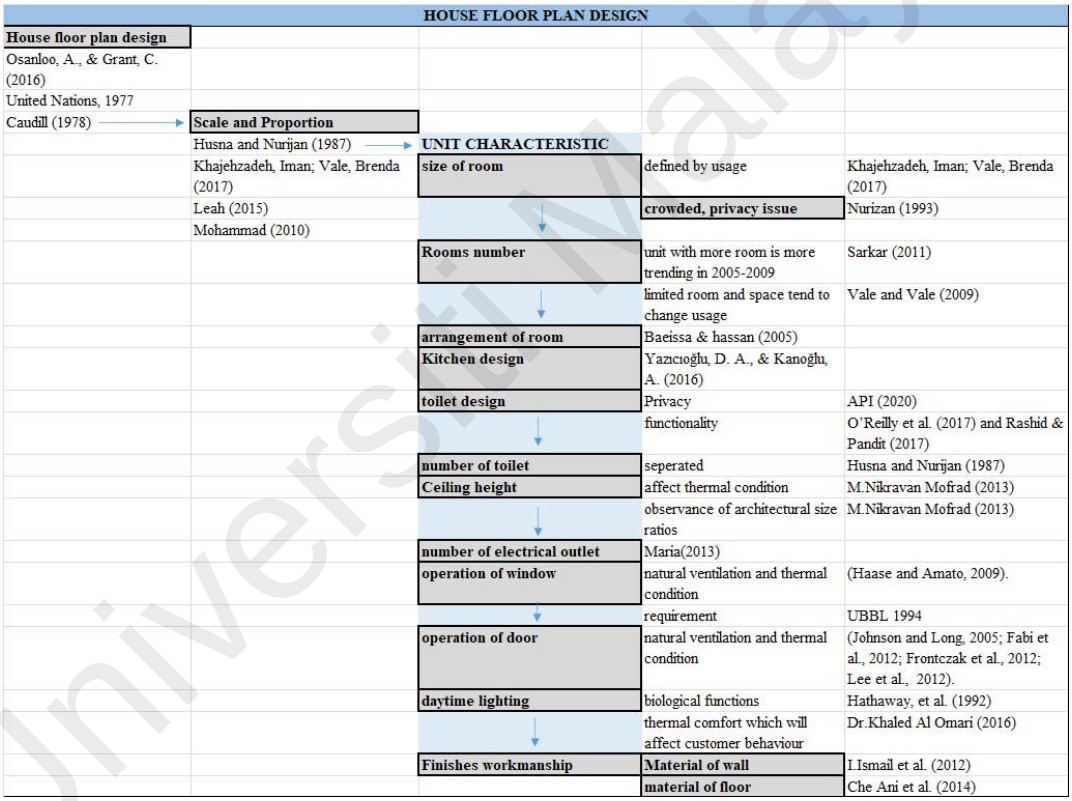


Figure 2.4: Summary of Literature Review on House Unit Layout Design

From the figure above, the customer satisfaction factor to house unit layout design is:

a) House floor plan design

b) Scale and proportion

c) Size of room

d) Privacy issue due to size of the room

e) Number of rooms

f) Arrangement of rooms

g) Kitchen design

h) Toilet design

i) Number of toilets

j) Ceiling height

k) Number of electrical outlets provided

l) Operation of window and door

m) Daytime lighting

n) Finishes workmanship

o) Materials used for floor and wall

2.9.2 Summary of Customer Satisfaction factor to Project Design

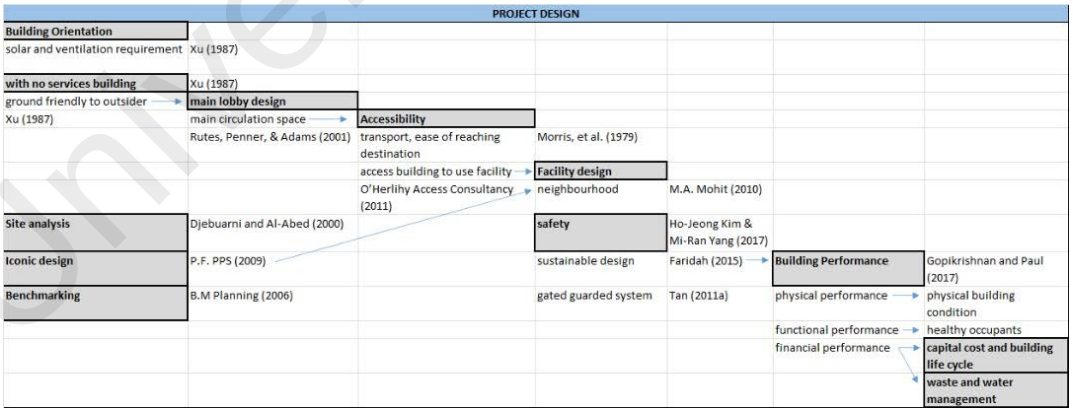


Figure 2.5: Summary of Literature Review on Project Design

From the figure above, the customer satisfaction factor to project design is:

a) Building orientation

b) Position of services building

c) Main lobby design

d) Accessibility

e) Facility design

f) Safety and security

g) Building performance

h) Capital cost and building life cycle

i) Waste and water management

j) Site analysis

k) Iconic design

l) Benchmarking

2.9.3 Summary of Customer Satisfaction factor to Architect's role in Architectural Services

ARCHITECTURAL SERVICES (ROLES OF ARCHITECTURE)		
Reputation of the service provider	Araloyin and Olatoye (2011)	
loyalty is associated satissfied customer	Dick and Basu (1994)	
confident, trust	(Morgan & Hunt, 1994)	
Quality assurance →	**Supervision**	A. Griffith (1990)
Leo A Daly (2021)	**Architectural defect**	Grobler (2002)
	Change after design	Chang (2002)
	10 common factor to change after design	Nurul (2018)

Figure 2.6: Summary of Literature Review on Customer Satisfaction factor to Architect's role in Architectural Services

From the figure above, the customer satisfaction factor to architectural services is:

a) The reputation of the Architect

b) Reputation to customer loyalty

c) Reputation to product quality confident

d) Quality assurance

e) Supervision of building work

f) Architectural defect

g) Design changes after constructed

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

Several essential features have been uncovered due to the extensive literature research done above. According to Marczyk et al. (2005), the study should be carried out by selecting an appropriate research approach. This is done to reduce the difficulty and complexity of the research and, as a result, to guide the research to find the link between the measurements. The research technique used should be the most appropriate and relevant to the nature of the research issues.

There are two sorts of research methodologies, according to Vanderstoep and Jognston (2009): (1) qualitative approaches and (2) quantitative techniques.

On the other hand, Creswell advocates a hybrid strategy (2009). According to Newman and Benz (1998), among the three techniques shown in Figure 3.1, the qualitative and quantitative approaches are clearly at opposite ends of the sequence, while the complete mixed approach represents a synthesis of both approaches and the formation of a new element. As a result, Zone A represents an entirely qualitative research technique, while Zone E represents a completely quantitative research strategy. Zone C, therefore, represents the mixed-method research strategy. Zones B and D, on the other hand, have been created. In terms of research methodology, Zone B represents mostly qualitative mixed research, while Zone D represents primarily quantitative diverse research.

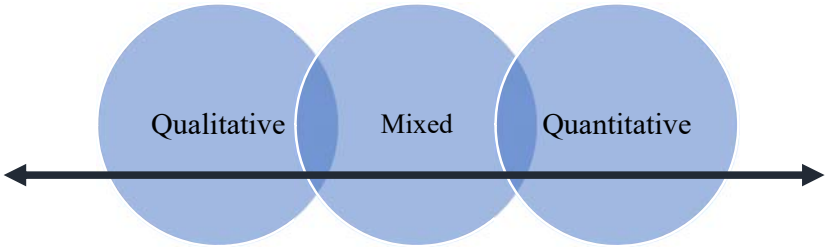


Figure 3.1 Mixed methods research (*Tashakkori and Teddlie, 2005*)

The main objectives of this chapter are as follows:

(a) To discuss the method of data collection used,

(b) To discuss the data collection process and

(c) To describe the statistical techniques used for data analysis

3.2 Research Design

According to Nachmias and Nachmias (1991), the research process is a paradigm of scientific inquiry or scientific activities that may yield knowledge. The problem, hypothesis, study design, measurement, data collecting, data analysis, and generalization are the seven significant steps of the research process identified by Nachmias and Nachmias (1991). The research design was being designed with reference to Bailey (1978) and Sekaran (2003) for this study as below:

Stages	Bailey (1978)	Sekaran (2003)	The research design for this study
1	Choosing the research problem and stating the hypothesis	Observation – Research interest is identified	Research background and problem statement. The objectives of the research were defined.
2	Formulating the data	Preliminary data gathering	An extensive literature review by accessing and approaching in a different way of sources.
3		Identification of problem	A pilot study to determine the customer satisfaction factor to the architectural design quality of building projects (To answer objective no.1) and the architect's role in managing the architectural design quality of building projects. (To answer purpose no. 2)
4		Theoretical framework	Finalizing study from literature review
5		Research design	Survey Instruments development in google form format
6	Gathering the data	Data collection, analysis, and interpretation	Questionnaire distributed
7	Coding and analyzing the data	Deduction	Questionnaire data was collected and analyzed. Qualitative interview with the professional architect of the building project regarding their perspective (To answer objective no.3)
8	Interpreting the result to test the hypothesis	Report writing	Research discussion
9		Report presentation	
10		Managerial	

Table 3.1: Research design with reference to Bailey (1978) and Sekaran (2003)

3.3 Research Purpose

The Research purpose are as below:

1. Research and identify consumer satisfaction aspects in high-rise residential architectural design. It is based on Yeoh (2014)'s assertion in the problem statement that house buyers today are increasingly concerned with their quality of life.
2. To research and give consumer satisfaction aspects to the home designer, a professional architect, for consideration throughout the design and planning phase of their project. According to Tan (2011), a comprehensive understanding of how Malaysian house buyers differ in their thoughts, opinions, and preferences for home acquisition is required for the architect. Furthermore, it supports Yvonne's (2014) assertion that architects prefer to design and create the ideal house for the home buyer to meet their lifestyle.
3. 3. To examine the customer satisfaction characteristics that are most important to Malaysian house buyers and will influence their purchase behavior. This is also to explore the quality qualities of the architect, who has a considerable effect on house purchasers' buying choices in terms of unit design, project design, and professional services.

3.4 Area of Study

This study was carried out in Klang Valley, Malaysia. The rationale behind this choice is that Klang Vally is a metropolitan city where all necessary offices and relevant institutions in the city will help study the requirement of high-rise residential buildings in the daily life of citizens. Hence, there is a possibility of obtaining all necessary and relevant data from these target people.

3.5 Research Approach

According to Kombo (2006), there are two types of research methodologies: quantitative approaches that include numerical data or quantified data and qualitative methods that involve non-numerical data or unquantified data. The researcher uses this to represent non-standardized facts, such as management decisions, that must be presented via language. The researcher assessed the data gathered using both quantitative and qualitative techniques. Certain discoveries needed human interpretation of data obtained from consumers, but others were accomplished by using simple mathematical calculations such as mean, percentages, and tabulations.

3.6 The population of the Study

The term “population of the study” refers to all the instances of humans, objects, or components that meet a given specification, i.e., all the items under investigation in any area of research. This research was chosen to be done in a 342 unit high-rise residential complex. As a result, the population for this research consisted of around 342 respondents. Because the research’s population consisted of many clients, obtaining all of them to participate in this study was impossible; hence, sampling was unavoidable. The term “sampling” refers to a subset of the population the research will be conducted. (Krishna swami, 1998) and a sample design is a predetermined strategy for getting a sample from a specific population. It refers to the method or approach used by the researcher to pick things for the sample (Kothari, 2005).

3.7 Sampling and Sample Size

3.7.1 Sample Size

The questionnaire for the research was sent to 342 occupants of a high-rise residential complex. Additionally, while determining the sample size, non-response, attrition, and respondent death must be addressed, i.e., some participants will fail to return questionnaires, will withdraw from the research, or will return questionnaires that are incomplete or wrecked (e.g., missing out items, putting two ticks in a row of choices instead of only one). Consequently, it is better to overestimate the sample size required to account for redundancy than underestimate it (Gorard 2003: 60). Unless there are guarantees of access, response, and possibly the researcher’s presence during the research process (e.g., the presence when questionnaires are completed), it may be prudent to estimate the required sample size up to twice the size required to account for

such loss of clean and complete questionnaires or responses. Bryman and Bell (2007) indicate that a larger sample size results in more accurate conclusions. There are several methods for determining the sample size. Given the total population size, Yamane's (1967) technique was used to determine a sample size representative of the 11,876 dentists currently practising in Thailand (The Royal College of Dental Surgeons of Thailand, 2012). The sample size was determined using the formula shown below. A 95% confidence level and p = 0.05 are assumed for this equation.

$$n = \frac{N}{1 + N * (e)^2}$$

Figure 4.1: Sample size calculation (*source: Yamane's 1967*)

(where 'n' is the sample size, 'N' is the population size, and 'e' is the level of precision)

Hence,

Sample size for this research (n) = $\frac{342}{1 + 342 * (0.05)^2}$

$= \frac{342}{1.81}$

$= 188.95$

$= 189$

The sample size for this study is 189 home buyers from the formula.

3.7.2 Respond Rate

According to Survey Anyplace (2018), 33% as the average response rate for all survey channels, including in-person and digital. Hence, the response rate for this study as below:

Respondents needed = 33% * 189 sample size

= 62.37

= 63 responses needed

3.7.3 Using the model to measure customer satisfaction

Oliver's disconfirmation model has been used multiple times to determine customer satisfaction, as shown by Oliver (1980b, 1981, 1983, 1987), Patterson and Spreng (1997), and Swan and Trawick (1998). (1981). Likert scales are often used to determine the strength of a consumer's impression in relation to their expectations. To do this, customers plot their viewpoint in relation to many anchor statements addressing expectations, as seen in the image below. These assertions are factual when perceptions are less than, equal to, or more than projected. The scale may be used numerous times to address all of the elements that influence customer satisfaction in a specific circumstance. The scores are then averaged to provide an overall satisfaction score.

Question 1: House unit floor layout plan affects customer satisfaction.				
1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Table 4.1: Scale used to measure customer satisfaction

CHAPTER 4 RESEARCH FINDING

4.1 Introduction

The findings of the analysis of the quantitative data gathered in the current investigation are presented in this chapter. This section summarises the numerous studies on empirical data collected from the survey. The data was examined using the Statistical Package for Social Sciences program (SPSS 1997). Two goals to accomplish. The first goal is:

1. to test the levels of home buyer's satisfaction with each factor to house design, project design, and architectural service quality sections,
2. to determine the relative importance index of each element to customer satisfaction in three areas.

4.2 Respond Rate

In this study, a total of 70 responses were collected. The result of reactions was more than required, as calculated in the previous chapter.

4.3 Profile of Respondents

Most of the house buyers who responded to the questionnaires were aged between 31 and 40 years. The results also show that most of the respondents were men, and most of the respondents have working experience of 6-10 years, as presented in Table 4.2.

		Frequency	Percentage (%)
Age of respondents	21-30	30	42.9
	31-40	31	44.3
	41-50	9	12.9
	More than 50	0	0
Gender	Male	39	55.7
	Female	31	44.3
Years of working experiences	Less than 5 years	23	32.9
	6-10 years	32	45.7
	11-15 years	9	12.9
	More than 16 years	6	8.6

Table 4.2: Profile of Respondents

4.4 Reliability analysis result

Cronbach alpha coefficient	Standardized Cronbach alpha coefficient	Number of factors	Number of respondents
0.933	0.936	37	70

Table 4.3: Reliability analysis result

Table 4.3 shows the results of the model's Cronbach's α coefficient, including the Cronbach α coefficient value, the standardized Cronbach α coefficient value, the number of items, and the number of samples used to measure the reliability quality level of the data. The Cronbach's α coefficient value of the model is 0.933, indicating that the reliability of the questionnaire is excellent.

4.5 Validity analysis result

KMO test and Bartlett's test on Section B		
KMO value		0.797
Bartlett sphericity test	Approximate chi-square	557.457
	df	153.000
	p	0.000***

Note: ***, **, * represent the significance level of 1%, 5%, and 10% respectively

Table 4.4: Validity analysis result on Section B

Table 4.4 shows that the KMO test results show that the KMO value is 0.797. At the same time, the Bartlett sphere test results show that the significance P-value is 0.000***, which is significant at the level. The null hypothesis is rejected, and the variables are correlated. Factor analysis Effective, the degree is average.

KMO test and Bartlett's test on Section C		
KMO value		0.793
Bartlett sphericity test	Approximate chi-square	297.345
	df	66.000
	p	0.000***

Note: ***, **, * represent the significance level of 1%, 5%, and 10% respectively

Table 4.5: Validity analysis result on Section C

Table 4.5 shows that the KMO test results show that the KMO value is 0.793. At the same time, the Bartlett sphere test results show that the significance P-value is

0.000***, which is significant at the level. The null hypothesis is rejected. There is a correlation between the variables. Factor analysis Effective, the degree is average.

KMO test and Bartlett's test on Section D		
KMO value		0.828
Bartlett sphericity test	Approximate chi-square	296.141
	df	21.000
	p	0.000***

Note: ***, **, * represent the significance level of 1%, 5%, and 10% respectively

Table 4.6: Validity analysis result on Section D

Table 4.6 shows that the KMO test result indicates that the KMO value is 0.828. At the same time, the Bartlett sphere test result shows that the significance P-value is 0.000***, which is significant at the level. The null hypothesis is rejected, and the variables are correlated. Factor analysis Effective, the degree is suitable.

Overall KMO test and Bartlett's test		
KMO value		0.733
Bartlett sphericity test	Approximate chi-square	1665.028
	df	666.000
	p	0.000***

Note: ***, **, * represent the significance level of 1%, 5%, and 10% respectively

Table 4.7: Overall Validity analysis result

Table 4.7 shows the KMO and Bartlett's sphere test results, which are used to analyze whether factor analysis can be performed. The KMO test result indicates that the KMO value is 0.733. At the same time, the Bartlett sphere test result shows that the significance P-value is 0.000***, which is significant at the level. The null hypothesis is rejected, and the variables are correlated. Factor analysis Effective, the degree is average.

4.6 Research finding on Section B: Customer satisfaction factor to house unit design

This section is to identify the factor affecting customer satisfaction in the architectural design of Malaysia's high-rise residential building. In section B, the respondents were questioned on the relationship between house unit design and customer satisfaction. From Table 4.8, the result of each factor in section B has been responded to and calculated by the RII formula to evaluate the ranking of the element. Hence, Table 4.9 shows the customer satisfaction factor to house unit design are identified and arranged as follow by order: (1) House floor plan design, (2) Quality of finishes workmanship (painting, fine-tune), (3) Quality of material used for wall, (4) Scale and proportion of unit, (5) Size of the rooms in the unit, (6) Number of rooms in the unit and Brightness or light in the unit during daytime, (7) Location of different rooms, (8) Operation of the window, (9)Kitchen design, (10) Bathroom's design, operation of door and amount of privacy available, (11) Number of bathroom given, (12) Individual space needed for each family members, (13) Ceiling height and (14) Number of placements of electrical outlets.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	RII
House floor plan design (B1)	0	0.000	0	0.000	6	8.571	16	22.857	48	68.571	0.920
Scale and proportion (B2)	0	0.000	2	2.857	8	11.429	20	28.571	40	57.143	0.880
Number of rooms in unit (B3)	1	1.429	1	1.429	14	20.000	20	28.571	34	48.571	0.843
Size of the rooms in unit (B4)	0	0.000	4	5.714	7	10.000	17	24.286	42	60.000	0.877
Location of different rooms (B5)	0	0.000	3	4.286	12	17.143	23	32.857	32	45.714	0.840
Individual space needed for each family members (B6)	1	1.429	2	2.857	16	22.857	26	37.143	25	35.714	0.806
Kitchen design (B7)	1	1.429	2	2.857	12	17.143	27	38.571	28	40.000	0.826
Bathroom's design (B8)	2	2.857	3	4.286	15	21.429	19	27.143	31	44.286	0.811
Number of bathrooms given (B9)	0	0.000	5	7.143	15	21.429	22	31.429	28	40.000	0.809
Ceiling height (B10)	0	0.000	8	11.429	11	15.714	29	41.429	22	31.429	0.786
Amount of privacy available (B11)	0	0.000	5	7.143	14	20.000	23	32.857	28	40.000	0.811
Number of placements of electrical outlets (B12)	1	1.429	8	11.429	14	20.000	24	34.286	23	32.857	0.771
Brightness or light in the unit during daytime (B13)	0	0.000	5	7.143	5	7.143	30	42.857	30	42.857	0.843
Quality of materials used for wall (B14)	0	0.000	2	2.857	2	2.857	28	40.000	38	54.286	0.891
Operation of windows (B15)	0	0.000	4	5.714	10	14.286	28	40.000	28	40.000	0.829
Operation of doors (B16)	1	1.429	3	4.286	14	20.000	25	35.714	27	38.571	0.811
Quality of finishes workmanship (painting, fine-tune) (B17)	0	0.000	1	1.429	3	4.286	20	28.571	46	65.714	0.917

Table 4.8: Frequency analysis result on the relationship between house unit design and customer satisfaction.

Customer satisfaction factor to house unit design	RII	Rank
House floor plan design (B1)	0.920	1
Quality of finishes workmanship (painting, fine-tune) (B17)	0.917	2
Quality of materials used for the wall (B14)	0.891	3
Scale and proportion (B2)	0.880	4
Size of the rooms in the unit (B4)	0.877	5
Brightness or light in the unit during daytime (B13)	0.843	6
Location of different rooms (B5)	0.840	7
Operation of windows (B15)	0.829	8
Kitchen design (B7)	0.826	9
Bathroom's design (B8)	0.811	10
Operation of doors (B16)	0.811	10
Amount of privacy available (B11)	0.811	10
Number of bathrooms given (B9)	0.809	11
Individual space needed for each family members (B6)	0.806	12
Ceiling height (B10)	0.786	13
Number of placements of electrical outlets (B12)	0.771	14
Total average of RII	0.839	

Table 4.9: Customer satisfaction factor to house unit design by ranking

4.7 Research finding on Section C: Customer satisfaction factor to project design

This section is to identify the factor affecting customer satisfaction in the architectural design of Malaysia's high-rise residential building. In section C, the respondents were questioned on the relationship between project design and customer satisfaction. From Table 4.10, the result of each factor in section C has been responded to and calculated by the RII formula to evaluate the ranking of the factor. Hence, the customer satisfaction factor to project design is identified and arranged as follow by ranking in Table 4.11: (1) Safety and security, (2) Building access, (3) Building durability and lifespan, (4) Front of the building shall not face STP, TNB, Surau, Water tank, etc., (5) facility plan design and usage, (6) Building performance requirements, (7) Building facing direction (North or South) as a matter of priority, (8) Waste and water

management (including rainwater), (9) Iconic building façade, (10) Building benchmarking, (11) Main lobby design and (12) Site Survey.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	RII
Building facing direction (North or South) as a matter of priority (C1)	0	0.000	3	4.286	13	18.571	29	41.429	25	35.714	0.817
Front of building shall not face STP, TNB, Surau, Water tank, etc. (C2)	0	0.000	3	4.286	7	10.000	26	37.143	34	48.571	0.860
Main lobby design (C3)	1	1.429	3	4.286	18	25.714	25	35.714	23	32.857	0.789
Facility plan design and usage (C4)	1	1.429	3	4.286	8	11.429	24	34.286	34	48.571	0.849
Iconic building façade (C5)	2	2.857	5	7.143	11	15.714	22	31.429	30	42.857	0.809
Site Survey (C6)	3	4.286	5	7.143	20	28.571	25	35.714	17	24.286	0.737
Building access (C7)	0	0.000	0	0.000	6	8.571	27	38.571	37	52.857	0.889
Waste and water management (including rainwater) (C8)	1	1.429	4	5.714	14	20.000	22	31.429	29	41.429	0.811
Safety and security (C9)	0	0.000	0	0.000	4	5.714	22	31.429	44	62.857	0.914
Building durability and lidespan (C10)	0	0.000	3	4.286	6	8.571	22	31.429	39	55.714	0.877
Building performance requirements (C11)	1	1.429	2	2.857	10	14.286	24	34.286	33	47.143	0.846
Building benchmarking (C12)	1	1.429	4	5.714	13	18.571	28	40.000	24	34.286	0.800

Table 4.10: Frequency analysis result on the relationship between project design and customer satisfaction.

Customer satisfaction factor to project design	RII	Rank
Safety and security (C9)	0.914	1
Building access (C7)	0.889	2
Building durability and lifespan (C10)	0.877	3
The front of the building shall not face STP, TNB, Surau, Water tank, etc. (C2)	0.860	4
Facility plan design and usage (C4)	0.849	5
Building performance requirements (C11)	0.846	6
The building facing direction (North or South) as a matter of priority (C1)	0.817	7
Waste and water management (including rainwater) (C8)	0.811	8
Iconic building façade (C5)	0.809	9
Building benchmarking (C12)	0.800	10
Main lobby design (C3)	0.789	11
Site Survey (C6)	0.737	12
Total average of RII	0.833	

Table 4.11: Customer satisfaction factor to project design by ranking

4.7 Research finding on Section D: Customer satisfaction factor to architect services quality

This section determines the role of the professional architect in managing and assuring the high-rise residential architectural design quality. In section D, the respondents were questioned on the relationship between architect services quality and customer satisfaction. From Table 4.12, the result of each factor in section D has been responded to and calculated by the RII formula to evaluate the ranking of the factor. Hence, the customer satisfaction factor architect services quality is identified and arranged as follow by ranking in Table 4.13: (1) Defect on architectural work, (2) Project design changes after sales, (3) Architect supervision skill on construction work and Quality assurance on building work by Architect, (4) Architect reputation has direct connection to customer trust on quality, (5) Architect reputation and (6) Architect reputations affect the customer loyalty.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	RII
Architect reputation (D1)	5	7.143	6	8.571	15	21.429	27	38.571	17	24.286	0.729
Architect reputation has direct connection to customer trust on quality (D2)	4	5.714	5	7.143	13	18.571	21	30.000	27	38.571	0.777
Architect reputations affect the customer loyalty (D3)	8	11.429	3	4.286	18	25.714	20	28.571	21	30.000	0.723
Quality assurance on building work by Architect (D4)	2	2.857	3	4.286	10	14.286	23	32.857	32	45.714	0.829
Architect supervision skill on construction work (D5)	1	1.429	2	2.857	9	12.857	32	45.714	26	37.143	0.829
Project design changes after sales (D6)	0	0.000	0	0.000	4	5.714	26	37.143	40	57.143	0.903
Defect on architectural work (D7)	0	0.000	1	1.429	0	0.000	20	28.571	49	70.000	0.934

Table 4.11: Frequency analysis result on the relationship between architect services quality and customer satisfaction.

Customer satisfaction factor architect services quality	RII	Rank
Defect on architectural work (D7)	0.934	1
Project design changes after sales (D6)	0.903	2
Architect supervision skill on construction work (D5)	0.829	3
Quality assurance on building work by Architect (D4)	0.829	3
Architect reputation has direct connection to customer trust on quality (D2)	0.777	4
Architect reputation (D1)	0.729	5
Architect reputations affect customer loyalty (D3)	0.723	6
Total average of RII	0.818	

Table 4.12: Customer satisfaction factor to architect services quality by ranking

4.8 Profile of Interviewee

The questionnaire was arranged by ranking and interview with the particular project architects, as shown below.

	Interviewee A	Interviewee B	Interviewee C
Age of interviewee	35	33	26
Gender	Male	Female	Male
Position	Professional Architect	Graduate Architect	Architect Assistant
Years of working experiences	13	10	4

Table 4.13: Profile of Respondents

4.9 Interview finding on professional architect team to the questionnaire finding.

In the Table below, the respondents were being questioned and agreed or disagreed on the questionnaire finding result. The respondents have also added some arguments and statements based on their perspectives, discussed in the next chapter. This interview aims to evaluate the customer satisfaction factor in both home buyer and architect perspective view.

Rank	Customer satisfaction factor by Ranking	Interviewee A	Interviewee B	Interviewee C
Customer satisfaction factor to house unit design				
1	House floor plan design (B1)	Agree	Agree	Agree
2	Quality of finishes workmanship (painting, fine-tune) (B17)	Agree	Agree	Agree
3	Quality of materials used for wall (B14)	Agree	Agree	Agree
4	Scale and proportion (B2)	Agree	Agree	Agree
5	Size of the rooms in unit (B4)	Agree	Agree	Agree
6	Brightness or light in the unit during daytime (B13)	Agree	Agree	Agree
7	Location of different rooms (B5)	Agree	Agree	Agree
8	Operation of windows (B15)	Agree	Agree	Agree
9	Kitchen design (B7)	Agree	Agree	Agree
10	Bathroom's design (B8)	Agree	Agree	Agree
10	Operation of doors (B16)	Agree	Agree	Agree
10	Amount of privacy available (B11)	Agree	Agree	Agree
11	Number of bathrooms given (B9)	Agree	Disagree	Agree
12	Individual space needed for each family member (B6)	Disagree	Disagree	Agree
13	Ceiling height (B10)	Disagree	Disagree	Agree
14	Number of placements of electrical outlets (B12)	Disagree	Disagree	Disagree
Customer satisfaction factor to project design				
1	Safety and security (C9)	Agree	Agree	Agree
2	Building access (C7)	Agree	Agree	Agree
3	Building durability and lifespan (C10)	Agree	Agree	Agree
4	The front of the building shall not face STP, TNB, Surau, Water tank, etc. (C2)	Agree	Agree	Agree
5	Facility plan design and usage (C4)	Agree	Agree	Agree
6	Building performance requirements (C11)	Agree	Agree	Agree
7	The building facing direction (North or South) as a matter of priority (C1)	Agree	Agree	Agree
8	Waste and water management (including rainwater) (C8)	Agree	Agree	Agree
9	Iconic building façade (C5)	Disagree	Disagree	Agree
10	Building benchmarking (C12)	Agree	Agree	Agree
11	Main lobby design (C3)	Disagree	Disagree	Agree
12	Site Survey (C6)	Agree	Agree	Agree
Customer satisfaction factor architect services quality				
1	Defect on architectural work (D7)	Agree	Agree	Agree
2	Project design changes after sales (D6)	Agree	Agree	Agree
3	Architect supervision skill on construction work (D5)	Agree	Agree	Agree
3	Quality assurance on building work by Architect (D4)	Agree	Agree	Agree
4	Architect reputation has a direct connection to customer trust in quality (D2)	Disagree	Disagree	Agree
5	Architect reputation (D1)	Disagree	Disagree	Agree
6	Architect reputations affect customer loyalty (D3)	Disagree	Disagree	Disagree

Table 4.14: Interview finding on professional architect team to the questionnaire finding

CHAPTER 5 RESEARCH DISCUSSION

5.1 Introduction

This chapter summarises the findings from the preceding chapter's quantitative data analysis. The acquired data and findings will be examined and interpreted, and the phenomena will be explored and qualitatively explained. All of the data that has been evaluated will be addressed further. This chapter will go through each part with a higher result than the overall average RII. The least essential index will also be addressed. The research's limitations will be highlighted, along with suitable explanations.

5.2 Section B: Customer Satisfaction factor to house unit design

All variables from Table 3 with a result larger than RII 0.839 will be addressed. The data suggested that the most significant factor affecting customer satisfaction in unit design is the house floor plan layout design. This finding supports Osanloo, A., and Grant, C. (2016)'s assertion that the floor plan layout communicates the inside features of a unit's construction to match client expectations. Interviewee A concurred with this assumption, noting that the layout of a unit floor plan is related to the spatial 67standardized and sequence of spaces. According to Interviewee B, the design of the unit floor plan layout is critical for the home buyer because it communicates the utility of the whole unit by displaying the size and proportion of each section in the floor plan. For ranks 4 and 5, the scale and proportion of the unit, as well as the room size within the unit, are consistent with the finding report by Khajehzadeh, Iman; Vale, Brenda (2017) that an insufficient design size of rooms, scale, and proportion of the unit will detract from customer satisfaction and purchasing behavior for the property.

Consequently, such data may aid architects in developing a better understanding of what homebuyers want and need.

For rankings 2 and 3, the quality of finishing and workmanship and the quality of wall materials are compatible with the results reported by Sulaiman bin Sulaiman, A. Jusoh, K. S. Ying, and S. Soheilirad (2019). According to Wai Kiong (2005), the fault group is associated with finishing, alignment, evenness, joint, and gap and is strongly associated with poor workmanship quality. Consequently, craftsmanship quality should be enhanced to remove building faults and boost client satisfaction. Interviewee C concurred with the remark, stating that since finishes are the client's first impression, any defect in the quality of the finishes may be readily identified and negatively impact consumer contentment.

The unit's brightness or light output during daytime hours and the room's different locations have been evaluated 6 and 7 out of 14. Contrary to what Dr. Khaled Al Omari (2016) previously said, this component is insignificant in contrast to others. Although field research on sleep behavior and window preferences is limited (e.g., Bjorvatn et al. 2017; National Sleep Foundation 2013), post-occupancy evaluations have revealed a desire for a cooler bedroom temperature, for example, in bedrooms with mechanical ventilation (Berge & Mathisen 2016) or natural ventilation (Heide et al. 2021). According to Humphreys et al. (2013), one of the adaptations used to maintain thermal comfort in buildings is occupant behavior. In a hot-humid region such as Malaysia, inhabitants often adjust their thermal comfort by opening their windows. As a consequence of increased sunlight in the unit and rooms, increased indoor heat conditions may occur. Additionally, Gerhardsson (2021) did research and determined

that visual privacy is not essential in all situations; it may vary depending on the activity or position of the individual.

The ceiling height is ranked thirteenth out of fourteen criteria. In other words, this feature is less important to respondents in terms of customer pleasure. Unlike what M.Nikravan Mofrad (2013) said, Malaysian high-rise buildings now have 69standardized ceiling heights. According to the 1984 Uniform Building Bylaws, rooms in a residential building must have a minimum ceiling height of 2.5m for living rooms and bedrooms.

Electrical outlet count is the most negligible significant factor for responders, ranking 14th with a RII of 0.771. Contrary to what Maria (2013) previously said, the number of electrical outlets in a home is not determining customer pleasure in Malaysia. Additionally, respondent C said that the number of electrical outlets was mentioned in the property buyer's sales and purchase agreement. Consequently, the number of electrical outlets would not become a factor in customer satisfaction when it comes to home buyer purchasing decisions.

5.3 Section C: Customer Satisfaction factor to project design

Table 5 will be used to investigate all variables with a result larger than RII 0.833. According to the data, the most critical factor affecting customer satisfaction throughout the design phase is safety and security. This finding supports Faridah's (2005) thesis that constructing security in levels and zones ensures that the protection necessary for the building's occupants, which is residential, is supplied. Gillick (2002) adds to this by adding that a typical building security design is comprised of zones extending from the interior to the public domain. Additionally, respondent B said that fire escape is a vital

component for architects to consider during the design and planning phases. Building occupants need a rapid and easy fire escape to ensure their safety.

Building access was ranked second with an RII of 0.889, consistent with Faridah's previous conclusion (2005). Additionally, Archidaily (2020) said that accessibility is a critical issue in architecture, ensuring that the built environment is accessible to people of all abilities. Interviewee A confirmed that a pleasant and quick residential access from the main door to their allotted parking, the live lobby, and their unit would enhance the residential experience.

Building durability and lifespan came in third place with an RII of 0.877, which supports Faridah's (2005) assertion that the language of sustainability has become unavoidable for architects as the number of high-rise buildings adopting sustainable design increases to meet all environmental, social, and economic ideals. Interviewee B agreed, stating that architects now have a greater incentive to use sustainable materials and design to ensure a building's usefulness and performance throughout time.

With an RII of 0.846, building performance standards came in sixth place. Building performance standards also correspond with Sulfiah's (2020) study, which demonstrates that performance-based building design provides a way of thinking about how building users operate throughout the design process. Additionally, the front of the building's face with a shared utility service building is a factor in customer contentment, corroborating Xu's results (1987).

The design and implementation of the facility plan received a rating of 5 with an RII of 0.849, which is compatible with M.A. Mohit's findings report (2010). Residents are

content if facilities are nearby or within a short distance (Parker, 1976). The facility or facilities are primary factors that attract or repel persons from relocating to a new region (high rise). The absence of facilities and services may have a detrimental effect on residents' quality of life and extend the time required to adapt to new locations (Ho, 2000). The outcomes of this study indicate that renters are happier than owners since all of these facilities are pre-paid at the time of flat purchase, regardless of whether the user utilizes them or not.

The design of the main lobby achieved an 11 out of 12 grade. In other words, this factor has a more miniature bearing on respondents' customer satisfaction. Interviewee B agreed with the conclusion, noting that residential apartments often have a parking space, a lift lobby, and a standard floor hallway. The developer would always like an outstanding main lobby design to wow prospective purchasers and visitors, according to respondent C. Respondents ranked the site survey was ranked 12th in importance by respondents, with an RII of 0.737.

5.4 Section D: Customer Satisfaction factor to architect services quality

Having an average RII of 0.818 for all variables in Table 6, all variables with a result larger than RII 0.818 will be investigated. According to the data, the primary factor affecting client satisfaction with the quality of architect services is defects in architectural work. This finding tends to support Mohd Isa's (2016) assertion that apparent issues surrounding the design of specific building components, material selection, workmanship, and supervision tend to support the customer satisfaction factor of Architect supervision skill on construction work, which was ranked third with an RII of 0.829. In the specification-creation process, elements such as ambiguity should be eliminated. They should be appropriately gathered and kept throughout the early phases

of the project by the professionals, including the end-user. Coordination and cooperation between the design team, the end-user, and the contractor are other critical factors to consider throughout the project's implementation. This is compatible with Dvir's assertion (2003).

The architect's quality assurance on construction work is rated 3 with an RII of 0.829, corresponding to Bonaiuto's conclusions (2004). Additionally, Architect V (2017) speculates that quality assurance should be seen as a "state of mind" rather than a "technique" by architects. From programming to design to construction documentation, everyone's primary goal should be to guarantee that presentations and papers are complete, accurate, and well-thought-out. This conviction should permeate every thought, decision, and action throughout the project. Suppose this level of attention is maintained throughout the process. In that case, the resulting construction documents will always be of the highest quality, and only a tiny amount of time will be necessary for genuine quality control efforts.

Adjustments to project design after-sales are ranked second with an RII of 0.903, consistent with Nurul's results (2018). This is also consistent with Sung and Meng's (2009) observation that design errors not fixed during the design phase would manifest themselves during the construction phase, resulting in changes to the building's design. On the other hand, Respondent B disputes this premise, arguing that the majority of design adjustments are the consequence of a developer's change in necessity or specification. Sun and Meng (2009) assert that developer needs often change throughout a project for various reasons. She then said that if the developer modifies the project plan after work has started, it necessitates re-doing the work according to the revised plan or scope, supported by Hwang et al. (2014). Interviewee A corroborated

interviewee B's statement by referring to the client's lengthy decision-making process, an inaccurate initial design brief, and unforeseen ground conditions.

Meanwhile, respondent C affirmed the point, noting a lack of coordination among the specialists. As a member of the construction project's supervision officer, the architect has played a critical role in leading the coordination of a multi-participant environment, as Al-Hazmi (1987) and Clough and Sears (1993) have approved (1994). Inadequate coordination between stakeholders may result in disagreements that negatively affect the project (Arain et al. 2004).

The architect's reputation has been graded as 4, 5, and 6, respectively, with RII scores of 0.777, 0.729, and 0.723. Put another way, the architect's reputation is directly proportional to the architect's services. Contrary to the conclusions of the literature review, quality to home purchasers is not a factor of their contentment. Interviewee B concurred, adding that the home buyer is a layman with no professional or 73specialized skills in the architectural field and hence unable to assess the quality of architect services only based on the architect's reputation.

5.5 Summary on Customer Satisfaction factor to architecture design

To conclude this chapter, the customer satisfaction factor to the architecture design of Malaysia highrise residential building projects during the design and planning stage has been determined based on three categories as below:

	Customer satisfaction factor
Professional Services	Defect on architectural work
	Project design changes after-sales
	Architect supervision skill on construction work
	Quality assurance on building work by Architect
Project Design	Safety and security
	Building access
	Building durability and lifespan
	The front of the building shall not face STP, TNB, Surau, Water tank, etc.
	Facility plan design and usage
	Building performance requirements
Unit Design	House floor plan design
	Quality of finishes workmanship (painting, fine-tune)
	Quality of materials used for wall
	Scale and proportion
	Size of the rooms in the unit
	Brightness or light in the unit during daytime
	Location of different rooms

Table 4.15: Summary on Customer Satisfaction factor to architecture design

In summary, customer satisfaction is a significant subject for the professional party; however, customer satisfaction is different. The architect should not only focus on the project and unit design but also consider other social and commercial aspects. Satisfying the customer, which is the residents. All of the above findings should be considered in the design and planning processes. Based on their priority for different residential high-rise projects, these findings should be set as the principal of design and planning.

CHAPTER 6: CONCLUSION AND RECOMMENDATION

6.1 Introduction

This research looks at the aspects that influence consumer satisfaction with the architectural design of Malaysian high-rise residential buildings. It focuses on customer happiness in Malaysia's high-rise residential building architectural design.

6.2 Conclusion of the study

This chapter highlights the primary results and restates the study's main objectives. Furthermore, recommendations are provided to divert research efforts towards other prospective areas of architectural design management that need to be investigated.

6.2.1 Objective 1: To identify the factor affecting customer satisfaction in the architectural design of Malaysia's high-rise residential building.

When purchasing a home, the primary consideration for any home buyer is the floor layout. The floor plan allows house buyers to visualize their prospective home or property arrangement. A functional floor plan may generally show the position of each functional space, such as the living room, kitchen, dining area, and hallway to the bedrooms and bathroom. It is critical to demonstrate the link between rooms and areas and how to navigate a property. It is also an essential component of real estate marketing and home design, house building, interior design, and architectural projects. As a result, it is critical for architects to express their ideas more precisely while also demonstrating the possibilities of a plan. Furthermore, floor plans are essential for establishing furniture layouts to know what items would fit in their future home.

Furthermore, scale and proportion provide the house buyer with access to all areas of interior design. Scale is defined as the connection between two or more items. Scale refers to how an object relates to the area's size; hence, scale is vital in making a place functional, efficient, and comfortable. On the other hand, the proportion is a component compared to the total. It is more relative and involves training the designer's eye, appearance, and emotion they want to portray. Understanding the customer's goals and requirements allows the professional architect to employ scale and proportion interchangeably with a pattern, line, form, texture, tone, and color, among other things, to create a specific feel in a room or space while also generating harmony for the consumer.

The closing components of residential building projects, in particular, might be regarded as the most crucial. While the builder and designer make a great effort to assure dependability throughout a construction, it is equally crucial to note that the aesthetic and service aspects addressed after a project are what the ultimate homeowner will be left with when the keys are turned over. These are the final touches that transform a house into a home. As a result, house buyers must select which developer and designer would best meet their goals while paying close attention to detail. As a result, the finishing touches of a home building project are also the last opportunity to add character and detail to the structure. So, whether it's the color of the walls or the tiling of the floor, an excellent finish should be the objective from the start to create a result that everyone can be proud of and thrilled to live in.

The architect, as the designer, should prioritize the supply of safety features in building design considerations and quality factors. As the occupancy stage must be extended and

the inhabitants' safety must be balanced and ensured, the variables must be prioritized at the early planning stage of the housing project. The community and society of the housing complex should be prioritized in terms of a healthy environment, cleanliness, and a tranquil environment. Security considerations may be divided into two categories: those under the obligation of the building's players and those that fall under the community's responsibility. Security measures to prevent crime cases might be improved by allocating an appropriate layout of the fence, parking, internal units, and other potential crime places.

It was discovered that building high-rise function does not proportionately affect all parts of the building, city, and other related systems. The majority of high-rise characteristics were found to favorably impact the effectiveness oriental of the building system in this limited study; thus, most high-rise building factors tend to boost the effectiveness of building accessibility.

A vast number of previous research have found that increasing the number of facilities in high-rise residential buildings has a favorable effect. Home buyers choose to live in a building with a high number of facility equipment within walking distance. The architect's duty has evolved from just developing facility equipment to providing inhabitants with a comprehensive living environment facility design. In high-rise complexes, the architect typically gives and constructs such as a clubhouse, tennis court, jogging track, swimming pool, and gymnasiums. The availability of contemporary facilities was associated with greater levels of resident satisfaction (Cheng, 1993 and Lau, 1996).

In a nutshell, thirteen factors were identified as dominant customer satisfaction to high-rise residential building architectural design. They are:

i. House floor plan design

ii. Quality of finishes workmanship

iii. Quality of materials used for floor and wall

iv. Unit scale and proportion

v. Size of the rooms in the unit

vi. Brightness or light in the unit during daytime

vii. Location of different rooms

viii. Safety and security

ix. Building accessibility

x. Building durability and life span

xi. Building orientation

xii. Facility plan design and usage

xiii. Building performance requirements

6.2.2 Objective 2: To determine the role of the professional architect in managing and assuring the high-rise residential architectural design quality.

Numerous architectural flaws persist and are likely to reoccur in many projects. The majority of flaws are caused by craftsmanship due to poor work quality, a lack of oversight, and QA/QC by the architect. Design flaws are caused by inadequate design planning and material choices during the design stage. According to Chong, W.K., and Low, S.P., material problems are primarily caused by improper materials used in constructing the structure (2005). Meanwhile, the investigation of faults discovered during the defect liability period may be quite helpful as a control mechanism for determining the validity and dependability of a project's implementation process.

According to Buratu et al. (1992), the design change is frequently the consequence of quality deviation, non-conformance, quality failure, defect, or blunders that must be regularly monitored to avoid escalation. Even though practitioners frequently accept design alterations in high-rise residential building projects, their impact on project performance is unfavorable. It affects consumer expectations and reduces customer happiness because house buyers receive a different final product during unoccupied possession. As a result, it is critical for the architect to regularly conduct quality assurance on construction work.

Furthermore, quality assurance on construction work is vital since the architect drives the quality of the project from a design and technical standpoint. Their duty includes supervising the development of design and architectural plans and checking the progress of design layouts, design papers, and timelines. Maintains design standards and guidelines, and quality processes and serves as a point of contact for any quality-related concerns and issues.

In a nutshell, there are four dominant roles of professional architects in managing and assuring high-rise residential architectural design quality. They are:

i. Managing defects on architectural work
ii. Project design control
iii. Supervision skill on construction work
iv. Quality assurance on building work

6.2.3 Objective 3: To evaluate the customer satisfaction factor from the perspective of the home buyer and architect.

In Malaysia, the architect usually does not directly deal with the home buyer. They get to know the customer expectation from the developer. Hence, there is a gap or conflict between the architect and the home buyer. Through the interview and study, the architects have agreed on certain customer satisfaction factors, but there are still some arguments that the research wishes to highlight:

i. Architect hardly manages project design control as most of the time, those who request a design change for cost management or value engineering management are developers. Homebuyers usually blame the designer when they receive a poor design or different end product during vacant possession.

ii. The main lobby is not a primary factor in customer satisfaction regarding functionality, as residents seldom use and pass by the lobby. However, the architect was always requested to design the main grant lobby to welcome residents. There is a misunderstanding of the point of project design due to different perceptions.

iii. Operation of window and door is not the primary factor to customer satisfaction. However, it is the primary criteria for them when designing the unit layout as there is a requirement from uniform building by-laws that the architect has to follow.

6.3 Main conclusion of the study

The research began with a review of the literature. The bulk of customer satisfaction surveys focuses on project management rather than architectural design quality management. The architectural design quality management process is one of an architect's most challenging responsibilities. The developer, the project sponsor, and the architect always limit and control the architectural design to reduce construction costs and value engineering. The architectural design of a high-rise residential structure is always the first thing an outsider notices. It is always intended to wow the house buyer or the outsider. Unfortunately, it is also the first to be overlooked during the value engineering process.

According to the literature, the customer satisfaction element in architectural design is classified into three categories: unit plan, project design, and architectural services. Due to a lack of literature on the customer satisfaction factor in the architectural design of a high-rise residential building in Malaysia, preliminary research was conducted by 70 home buyers, and a structured interview was conducted with the project architects to evaluate the customer satisfaction factor from the architect's point of view.

The three data-gathering steps were a literature review, a questionnaire, and a structured interview. The study then used 17 factors to examine the customer satisfaction factor in high-rise residential building architectural design.

6.4 Recommendations for future research

This work can lead to a variety of lines of investigation. It would benefit future studies using the same research procedures to collect data.

i. A thorough investigation is required to discover the aspects that significantly impact client purchasing behavior in terms of architectural design requirements.

ii. A comparable analysis should be conducted on landed residential constructions.

iii. A comparable study should be conducted in another nation to investigate the various levels of consumer expectation and satisfaction.

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