CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This thesis presents a study of the identification of tenant office space preference through the use of a multi-criteria decision-making technique with the ultimate aim of the development of a tenant decision-making framework for office buildings at Kuala Lumpur city centre. It is important for the real estate sector to have sufficient information about the office occupiers, since knowledge of their needs and preferences enables the sector to respond to the changes efficiently. In addition, the traditional players in the real estate sector, such as investors, developers, and service providers, face new challenges: for instance, how will needs regarding office space and services change within the next number of years? The sector has to take into account that office occupiers perhaps no longer seek mere shelter for their employees, but need spaces enabling innovations, virtual communities, and social interaction. In order to better understand these needs and preferences, methods enabling measurements and analysis are needed. This involves the selection of a host of criteria that influence office occupation decision making within the context of the selection (pre let/lease) stage of occupation at purpose built office buildings. Numerous studies (Appel-Meulenbroek, 2008; Beltina & Labecki, 2006; Sing *et al*., 2004; Leishman *et al*., 2003, Leishman & Watkins, 2004; Leishman & Watkins, 2004) have been conducted to identify the factors that influence the office decision-making process of various different types of office space occupiers. As mentioned by Niemi and Lindholm (2010) real estate needs by organisations exist; although these are not mentioned by the Johari window model (Luft, 1969), as opposed to the identified public needs, private needs and external needs. Thus, it is pertinent to identify this organisation's (in this case,

occupier's) needs from the real estate perspective. From the real estate point of view, establishing the occupiers' needs is essential towards ensuring that the necessary real estate supply can meet their needs and demand.

It has been said that offices form the premier use of city building land, and that housing forms the economic base in metropolitan service centres and is owned by institutional investors (Howarth & Malizia, 1998). Since there has been a slow demand growth witnessed in the current Kuala Lumpur office market (see Section 2.4), the study of tenant office occupation by tenants as opposed to occupation by corporate occupiers draws great interest among building owners, investors and marketing agents of office buildings in Kuala Lumpur city centre. According to Cushman and Wakefield (2010), the demand for office space in Kuala Lumpur was mostly from the public sector and multinational companies. This scenario however has waned over the years as occupiers sought to renegotiate leases or move to less expensive premises. Since there is little information available to discover the needs and preferences of tenants as occupiers as opposed to looking at the corporate perspectives as highlighted by various studies (Brown, 2001; Gibson & Lizieri, 1998, 1999; O'Roarty, 2001, Dent & White, 1998, Sing *et al*., 2004; Nourse & Roulac, 1993), it is worthwhile uncovering the factors and criteria that are essential in the office occupation decision making process. To owners and investors in the commercial market, specifically the office market, identifying the tenants' specific requirements for office occupation would be useful towards the fulfilment of their particular objectives of maximising the office investment made in the market. Achieving full occupancy with quality tenants in a purpose built office building would enhance the maximisation of the returns through a stream of income. Marketing agents, on the other

hand, would benefit by minimising the search of both the types of tenants and office buildings in satisfying customer requirements.

Brown (2001) has suggested models for design decisions for a company's building design. The models are mainly examined from the architectural perspective but also the strategic corporate real estate perspective. Buildings were said to differ from most products because of their comparatively large size, their physical immobility, and because they contain people and processes.

Research works that determine the factors for office occupation are many and a long list of variables can be extracted from the literature but they produce no convergence on common factors applicable for all types of occupiers. The reason for this could be that each type of occupier may have different preferences and needs that emanate from its business perspectives (Leishman & Watkins, 2004). Therefore, despite the many studies on the factors of office occupation, there are apparently limited research works related to factors and criteria that influence office occupation decision making by tenants from a consumer behaviour perspective. From this understanding, it is anticipated that different factors will impact office occupation during the decision making process for office occupation in the city centre of Kuala Lumpur. It has been said in an earlier study in the UK that marketing research is distinct from traditional approaches to property research in that it seeks to translate the operational characteristics of the occupational market into a structured appraisal of the requirements of space and relate these to the opportunities to supply an appropriate product, namely buildings (Guy & Harris, 1997). This study by Guy and Harris (1997) also recognises that office occupiers are not homogenous; they are from different business sectors, are undergoing distinctive processes of change, which have spatial as well

as temporal variations. The failure of suppliers to recognise the relationship between the operational context of companies and the structure of demand for office space has exacerbated the mismatch between available office space and the needs of the occupier market (Guy & Harris, 1997).

Making an assessment of the requirements of tenants for office buildings in the central business district (CBD) of Kuala Lumpur (also known as Kuala Lumpur city centre) is a challenge, as there has been a trend of decentralisation to the suburban area of Kuala Lumpur in recent years (Ahmad & Isa, 2008). Thus, it is of interest to examine the factors and criteria that influence the decision of tenants who are still attracted to the centre of Kuala Lumpur.

This empirical study is crucial as it aims to identify, examine and analyse the factors that influence the decision making of tenants in the CBD area of Kuala Lumpur within the Malaysian office market context. The occupation of office space by tenants shall be the key element in ensuring the take-up of future office space (in the pipeline) with a projected 95 million square feet of space becoming newly available within the period up to 2015 (C H Williams, 2011). It is therefore envisaged that with the identification of the criteria and factors that are important to tenants, a framework of matching the preference and the oncoming supply of office space from purpose built office buildings can be developed. The findings from this study in turn can be a tool to ascertain the suitability of office space in matching tenants' preferences and needs for the oncoming office space supply in Kuala Lumpur city centre.

The following sections in this chapter will highlight research gaps, give an overview of the research methodology, and explain the significance of the study. This will be followed by the objectives of the study that address the issues which will be raised in the research questions and the statement of problems. This chapter will end with the limitation of the study, definition of terms used and thesis outline.

1.2 RESEARCH GAPS

A comprehensive literature review revealed that studies on office occupation by organisations include general office location (Daniels, 1991; Keeble & Tyler, 1995; Ball *et al.,* 1998, Wyatt, 1999; Dunse *et al*., 2001, Leishman *et al*., 2003), economic agglomeration (Marshall, 1961; Clapp, 1980; Krugman, 1991; Alexander, 1979; Di Pasquale & Wheaton, 1996, Bollinger *et al*., 1998), business and corporate real estate practices (Brown, 2001; Gibson & Lizieri, 1998, 1999; O'Roarty, 2001, Dent & White, 1998, Sing *et al*., 2004; Nourse & Roulac, 1993), behavioural approach to decision (Edwards, 1982; Cyert & March, 1963; Louw, 1998; Pen, 1999, Pallenberg & Wissen, 2002), heterogeneity of office stocks (Baum, 1991; Barras & Clark, 1996; Wyatt, 1999, Yusof, 2000; Leishman & Watkins, 2004; Leishman *et al*., 2003, Sing *et al.*, 2004), tenant satisfaction and retention (CBE, 1999; Dogge, 2004; Babcock, 2003; Sullivan, 2006; Appel-Meulenbroek, 2008), office space physical requirements (Bottom *et al*., 1999; Dent, 1998, Gerald Eve, 1997; Lizieri *et al.*, 1997, RICS Tenant Satisfaction Index, 2005; Rahim & Co, 2006; INSPEN, 1993).

The aspect of office occupation for purpose built office buildings at the city centre of Kuala Lumpur established from the mapping of the literature provides an insight into the absence

of research in these areas (see section 3.6). Based on the literature review, this study will look into the factors that influence office occupation decision making that relate to the following aspects: (i) the multi factors for selection (ii) the type of tenant organisations (the main category of tenant organisations) (iii) the location (city centre of Kuala Lumpur, Malaysia), (iv) the decision phase (pre occupation stage) and rational decision making aspects.

The first research gap is the selection of whether the study's focus is based on pure locational factors or involves multiple criteria/factors. Earlier neo urban economic studies (Clapp, 1980; Di Pasquale & Wheaton, 1996, Bollinger *et al*., 1998) failed to establish that occupiers as consumers of space are heterogeneous (Leishman *et al*., 2002) and may not choose only locational factors for their occupation decision making. These studies have stripped out the complexity of the decision making process and ignored the importance of factors other than location. Other studies on office occupation have revealed various determinants of the decision making and include factors other than location (Pittman & McIntosh, 1992; Dent & White, 1998; Higgins, 2000; Sing, 2004). Thus, study will focus on factors relating to location and business premises as well as additional factors within the agenda of the tenant organisations which utilise the space as a consumer. Therefore, it can be viewed that in a decision-making process, the tenants are exposed to multi-criteria selection.

The other research gap is the apparent lack of studies on the preference of office occupation by tenant organisations as opposed to corporate organisations. Many previous corporate real estate studies have highlighted the different aspects of business practices' requirements that may influence the choice of office space by corporate office occupiers (Gibson &

Lizieri, 1998, 1999). Decisions made at the occupier level regarding real estate are often long-term and may involve a determined real estate strategy, even at global level. Not many studies however have considered the requirements of a tenant organisation which may not view its office occupation decision from a long-term horizon or strategic perspective. In this study, the focus is on the tenant organisation occupier level, which refers to the organisation occupying the office properties as tenant. The needs and preferences can vary more frequently depending on the short-term internal and external factors of the organisation. This is particularly unique in Malaysia as the tenure of office occupation lasts for a period up to three (3) years with the option to renew for further terms, subject to the approval of the landlord (Adnan & Tey, 2008). As such, any tenant organisation may not want to view its decision in a strategic manner, unlike any corporate organisations. Rather, the decision may be operational and tactical, dealing with immediate requirements for business needs.

Corporate real estate is the business space that a firm requires on a long-term basis. This favours owner occupation on long lease contract. However, such long commitments are not appropriate for space that is needed for cyclical expansion or where there is uncertainty. In this situation, corporations need flexibility when entering and exiting the lease contract (McDonagh and Frampton, 2002).

It has been revealed that the selection criteria for office occupation are based on specific types of organisations as a measure to reveal the different preferences as mentioned by Leishman *et al*. (2002). The different characteristic of firms are said to influence the decision by having different sets of factors in determining the choice of office space. In view of this aspect, this study will examine the relative importance of the factors chosen in

the decision making by examining the preference of the three (3) major tenant organisations choices. Thus, this study will be unique by revealing the weights of importance factors chosen by the three (3) types of tenant organisations occupying the office space at the top grade office buildings (see section 2.6) in Kuala Lumpur, Malaysia.

The third research gap is the lack of studies on the country, Malaysia, particularly at the core of the major development of the commercial market, i.e., at the city centre of Kuala Lumpur. Although an earlier study by INSPEN (1993) identified the factors that are relevant to tenants of office buildings in Kuala Lumpur, the study did not identify the relative importance of the chosen factors nor make a distinction on the preferences of the different types of tenants.

The fourth research gap that this study addresses is the issue of office occupation decision making in the pre-let/lease stage which is synonymous to the pre-purchase stage in the consumer decision making process (see section 3.3). Adopting the bounded rational decision-making perspective of consumer decision making, this study adopts the satisficing and not maximising nature towards decision making by tenants in the pre occupation stage. The right decision made at this stage is crucial as it will ensure that the tenant organisation fulfills its business needs in the period of occupation.

The fifth research gap is the lack of use of multi-criteria decision making (MCDM) techniques in ascertaining the tenants' preference in the decision making framework of office occupation. Earlier studies have attempted to determine consumer preference in decision making through conjoint analysis (see section 3.9). However, these studies have

not looked at the MCDM tools which are said to possess qualitative (decision-making development) and quantitative (decision-making analysis) components.

1.3 STATEMENTS OF THE PROBLEMS

In striving to make Kuala Lumpur a world class city, one of the goals declared in the Kuala Lumpur Structure Plan 2020 is to enhance the role of Kuala Lumpur as an international commercial and financial centre.

It is thus the aim of the study to promote the achievement of the above vision by identifying the factors considered important by firms and organisations - especially those of international status - in order to attract and retain them in Kuala Lumpur, specifically the city centre. With the proposed development of 8.36 million square metres (90 million square feet) within the next ten (10) to fifteen (15) years (see section 2.5), it is anticipated that there will be an oversupply situation for the office market in Kuala Lumpur city centre. The recent announcement on the immediate future office developments in Kuala Lumpur includes the 100-storey Menara Warisan by Permodalan Nasional Berhad, which is one of the future mega office developments in the Kuala Lumpur city centre area for the next five years. Thus, it is pertinent to identify the important criteria which may influence the tenants' decision making as well as to determine the preference for occupation by tenants of office buildings in Kuala Lumpur city centre or at other locations. By developing the framework of decision making for office occupation of office buildings from these current tenants, a tool will exist to assess the future occupancy preferences and utilisation of the office space within a building in Kuala Lumpur's city centre. This in turn will assist in aligning future/expected demand trends in office space for the various

categories of tenants within the city centre as well as to anticipate possible strategies to attract and retain tenants within Kuala Lumpur's office space. The outcome of the study will also provide policy makers, office space providers, potential developers and investors with indicators of the potential demand for future office space provision within Kuala Lumpur.

Thus, given the above scenario, the general study problems are:

a) Consumer behaviour and decision making theories have not been exploited for the study on tenant preferences in office space decision making.

b) An exhaustive list of important factors in office space occupation decision making in Kuala Lumpur city centre context is generally not known although many past researches have been conducted in other countries.

c) An exhaustive list of important factors for the selection of office space within the purpose built office buildings as determined by tenants in Kuala Lumpur city centre is not available.

d) The relative importance of each of the main and sub factors for office space selection by the main tenant sectors of the office space at purpose built office buildings in Kuala Lumpur city centre is not known.

e) A decision making framework which would eventually form a systematic way of assessing the main tenant sectors suitability for a particular building is not available.

1.4 RESEARCH QUESTIONS

From the statements of problems, five (5) research questions are raised for this study. These questions are directed to addressing the issues pertaining to office occupation in Kuala Lumpur city centre, Malaysia. The following are the research questions (RQs):

(a) What theories and concepts of consumer decision making underpin tenant office space decision making? (RQ1)

(b) What factors influence office occupation decisions at purpose built office buildings generally in Kuala Lumpur city centre? (RQ2)

(c) What factors influence office occupation decisions by tenants at purpose built office buildings in Kuala Lumpur city centre? (RQ3)

(d) What are the factors' relative importances which influence the office tenants' occupation decision at Kuala Lumpur city centre that portray the different preferences of the main sectors at purpose built office buildings? (RQ4)

(e) What is the multi-criteria decision making framework which will eventually assist in the formation of an assessment tool for available office space at purpose built office buildings in Kuala Lumpur city centre? (RQ5)

1.5 RESEARCH OBJECTIVES

The main aim of the study is to develop a framework called Tenant Office Space (TOS) Preference Framework to be used in ascertaining the suitability of a to-be-leased office space for the various identified tenant sectors. The framework should be able to identify the main tenants deemed suitable to lease a particular office space.

Following the above aim and in line with the research questions, several objectives have been defined for the purpose of operationalising the research. The objectives are as follow:

a) To develop a conceptual office occupation decision making framework for Kuala Lumpur city centre through the synthesis of various theories and concepts.

b) To establish relevant factors influencing general office occupation decision making at purpose built office buildings in Kuala Lumpur city centre.

c) To identify the important factors influencing tenant office occupation decision making at purpose built office buildings in Kuala Lumpur city centre.

d) To determine the relative importances of the factors in tenant office space occupation decision that portray the preferences of the main sectors at purpose built office buildings in Kuala Lumpur city centre.

e) To develop a multi-criteria tenant office space preference framework for the main tenant sectors at Kuala Lumpur city centre.

1.6 RESEARCH METHODOLOGY

In order to achieve the above objectives, this research is to be carried out in two parts:

Part I (Preliminary): Determination of the general office occupation decision making factors in relation to Kuala Lumpur city centre.

This part aims to achieve the first and second objectives of the research. In this part, the research aim and objectives are achieved through a thorough literature search and experts' opinion. This is made through primary and secondary sources on office occupation studies

and consumer decision making theories. Since the special focus is on office occupation factors from a consumer decision making perspective, the conceptual framework is developed and the factors for office occupation are gathered. As the number of possible factors is large, a Delphi Method is adopted involving a total of forty (40) experts, comprising the property managers and property consultants marketing office space at office buildings, who are invited to provide the relevant factors regarding office occupation in Kuala Lumpur city centre.

Part II (Main): Determination of Tenant Office Occupation Decision Making Factors and Development of Tenant Office Space (TOS) Preference Framework for Kuala Lumpur city centre.

This part involves the identification of tenant important factors for office occupation decision making as well as the development of the Tenant Office Space (TOS) preference framework. Under this part, the first phase involves factor reduction process (i.e. to reduce factors identified earlier by the experts during Part I) through a tenant survey. Then, in the next phase, the relative importances of the reduced factors are determined through the Analytic Hierarchy Process (AHP) technique to be conducted on three (3) selected main sectors of tenant organisations in Kuala Lumpur city centre. The reduced factors and their relative importance together with the identified measures for the factors form the criteria to be used in Tenant Office Space (TOS) preference framework. This framework will constitute the eventual development of a tool for the suitability assessment of tenants for a to-be-leased office space in an office building.

The plan of approach for this research is depicted in Table 1.1 as follows:

Table 1.1: Research Overall Plan

Part I - Preliminary			
Research Questions	**Research Techniques**	**Major Activities**	**Outcomes**
RQ1 & RQ2	• Desk Study • Delphi Technique	• Literature Review - Identify important factors for office occupation and consumer decision making concepts and preferences • Establish the Relevant Factors for Office Occupation in Kuala Lumpur city centre	• Identify factors for Office Occupation • Establish the Relevant Factors for Office Occupation in Kuala Lumpur city centre
Part II – Main Study			
Research Questions	**Research Techniques**	**Major Activities**	**Outcomes**
RQ3, RQ4, & RQ5	• Pilot Study • Questionnaire survey • Principal Component Analysis & Important Index (Phase I) • Analytic Hierarchy Process (AHP) (Phase II)	• Develop Survey Instrument • Data gathering • Establish the Main Occupiers at top grade office buildings in Kuala Lumpur city centre • Establish Tenant Important Factors in Study Area • Establish the hierarchy for the Factors • Establish relative weights of the Factors using 3 sectors of tenants • Develop TOS framework	• Identify the Important Factors by Tenants for Office Occupation in Kuala Lumpur city centre • Determine the 3 respective tenants' preference of the Factors by ranking/weights • Develop framework for Office Space Occupation by tenants

1.7 SIGNIFICANCE OF THE STUDY

This study addresses the multi-criteria decision making process of tenant occupation at office buildings focusing on the Kuala Lumpur city centre in Malaysia. Previous studies have provided the knowledge and literature on office occupation in various countries highlighting the various selection factors comprising location, office buildings' features, and rent determination, as well as office market studies (Rabianski & Gibler, 2009; Howland & Lindsay, 1997; Ball *et al*., 1998; Bollinger *et al*., 1998). Despite the plethora of literature (Lizieri, 2003; Dent, 1998; Dunse & Jones, 2002; Wadsworth, 1996; Pen, 1999;

Higgins, 2000) on office occupation, there has been a lack of empirical studies conducted in Malaysia to examine factors that influence office occupation in Kuala Lumpur city centre. Nor were there many research works on the guidelines for office development and marketing activities where models for successful tenants' decision making framework are developed. The following are reasons as to why this study is significant:

1.7.1 Office Market Specific

The study of the office market is crucial in light of the impending excess of office supply within the next five (5) years. Previous studies of the office property market have focused on forecasting trends for demand and supply as well as office rent based on time series studies as well as hedonic models (Stevenson, 2007; Tse & Fischer, 2003; Mourouzi-Sivitanidou, 2002; McDonald, 2002; Damesick, 2001). This research however, entails identifying the factors useful in the prediction of demand from the users, i.e., tenants' perspectives, who form part of the total aggregate of the occupiers representing the demand aspect of the market.

1.7.2 CBD - Kuala Lumpur City Centre Specific

As there are competing office submarkets to cater for office occupiers, the Kuala Lumpur city centre, which denotes the CBD of Malaysia's capital city, is an area filled with top grade office buildings. Although the area may be a select choice for major office occupiers, there has been a decentralizing trend to the suburban areas (Ahmad & Isa, 2008). Thus, to ensure a continuous sustainable office market in Kuala Lumpur city centre, it would be useful to identify the important factors preferred by the tenants.

1.7.3 Country Specific

No study is known to have been conducted to identify tenants' preference in occupation at Purpose Built Office Buildings (PBOs) in Malaysia. There has been a presumption that tenants will always be drawn to the space that offers the best location at the lowest rent possible. Studies in other countries such as Canada, the UK, Finland, the USA, the Netherlands, Australia, Latvia, and Singapore (Elgar & Miller, 2009; Appel-Muelenbroek, 2008; Beltina & Labeckis 2006; Sing *et al*., 2004; Leishman *et al*., 2003; Leishman & Watkins, 2004; Higgins *et al*., 2000; Pittman & McIntosh, 1992) have offered insights into the factors considered important to office occupation. It is the onus of this study to examine the factors preferred by tenants as well as to uncover the specific criteria for office occupation decision making in the Kuala Lumpur city centre context.

1.7.4 Use of Identified Important Factors

The empirical evidence and findings on the factors for tenant office occupation decision making in Kuala Lumpur will provide insights for practitioners and academics regarding the relevant information required to enhance the investment, development and marketing of office space. This information can therefore be an invaluable practical tip to office market investors, developers, managers and leasing consultants and agents.

1.7.5 Use of Multi-criteria Decision Making (MCDM) Tool - Analytic Hierarchy Process (AHP)

Another significance of this empirical study is that it is envisaged to develop the Tenant Office Occupation Framework that constitutes the factors that influence tenant decision making. Through the use of the MCDM tool, i.e., AHP, this Tenant-Office Space (TOS) framework is expected to have indicators or criteria that will be able to measure the

suitability of tenants for a specific office space in a building. Thus, it is envisaged that the study will provide useful insights to assist stakeholders in identifying the potential users of the available office space.

1.8 SCOPE OF STUDY

The study focused only on factors that influence office occupation decisions by tenants at top grade office buildings (identified through the classification study by Mohd *et.al*. , 2010) in Kuala Lumpur city centre, an area as defined by the City Hall of Kuala Lumpur. Other research areas regarding office decisions by tenants not in Kuala Lumpur city centre are, therefore, outside the scope of this study.

The period before the occupation stage of a leasing process consists of the decision making stage of the model of Consumer Decision Making as introduced by Hoyer & McInnis, (2010). Under the four identified domains, this study will only cover the decision making phase which involves the judgement and decision making elements. The other stages within the decision making process and the other three domains are beyond the scope of the study.

Also, this study covers only tenants in privately owned purpose built office buildings. Office occupiers in owner occupied or government owned office buildings are excluded from the study.

1.9 LIMITATIONS OF STUDY

Although a rigorous literature review was conducted on relevant studies to obtain the list of factors that influence office occupation (as in Tables 3.2, 3.3, 3.4 and 3.5), it is inevitable that some factors would be missed out. Therefore it is anticipated and expected that some factors which may have been found by later studies as influential to office occupation decision making are excluded in this study.

This is the first limitation of the study. This study is conducted on the premises of the office occupancy by tenants during the period of research (2008-2011) in Kuala Lumpur city centre, Malaysia. Thus, the findings of this study should be interpreted for the stated period and economic condition limited to the country or other countries which are in a similar condition. This is taking into consideration the leasing/tenancy period practised in Malaysia (see Chapter 3).

The sampling frame for this study comprises tenants from privately owned office buildings and does not capture office occupiers from owner occupied and government owned buildings. Hence, the data collected from the respondents will form the framework for the decision making process in the study. As such, it limits the ability of the framework to assess preference from office occupiers from the owner occupied and government owned buildings.

The most profound limitation is that this study is conducted only on one part of the Customer Decision Making Model (see section 3.3.2), which is the decision making phase. It covers the judgement and decision making aspects and not the entire model mentioned by

(Hoyer & MacInnis, 2010). Hence, other elements affecting the decision making are not included in this study. Within the consumer decision making phase, the bounded rational decision making theory is chosen to provide the limits of consumer choices (see section 3.3.3).

The final part of the development of the Tenant Office Space framework has its limitation primarily in the treatment of the changing nature of demand of space by occupiers (Levy, 1995). The framework does not account for the effect of the changing business environment and the economic conditions which would influence the preference of office occupiers. Instead, the TOS framework provides the measurement and assessment tool which relates to the property specific criteria which eventually would assist office space providers in planning space provision in order to prevent a significant glut of space.

1.10 DEFINITION OF TERMS

The following terms are used in the study.

Purpose-built office buildings (PBOs): are defined as to include places where service-oriented businesses are carried out as opposed to goods being manufactured or sold. They are intentionally built with offices as the dominant use. Dominant use means office use is not less than 75% of the net lettable area. The space includes office space within integrated development and space which was originally used for offices but has changed use on a temporary basis. It excludes office space within multipurpose buildings where use can interchange with retail, residential, hotel and industrial uses and office space that has permanently changed from its original use (NAPIC, PMR Q4 2006).

Another definition that has been developed is the one used in the Property Market Report by the National Property Information Centre (NAPIC), Department of Valuation & Property Services, Ministry of Finance. This definition will be used for the purposes of this study. The description of the various office locations within Kuala Lumpur is as follows:

Golden Triangle – area of PBOs and commercial buildings in Kuala Lumpur which is divided into four areas:

a. Covering Jalan Sultan Ismail from the junction of Jalan Ampang to the junction of Jalan Bukit Bintang.
b. Jalan P Ramlee, Jalan Bukit Bintang and part of Jalan Raja Chulan.
c. Jalan Tun Razak from the junction of Jalan Ampang and part of Jalan Davis.
d. From the junction of Jalan Ampang, Jalan Tun Razak until the junction of Jalan Ampang to Jalan Sultan Ismail.

Central Business District (CBD) – is the older section of the city compared to the Golden Triangle area. The area covers:

a. Along Jalan Sultan Ismail, i.e., from the junction of Jalan Ampang to Jalan Sultan.
b. Jalan Pudu and Jalan Cheng Lock.
c. Jalan Tunku Abdul Rahman, Jalan Raja Laut, Jalan Ampang from the junction of Jalan Sultan Ismail until Jalan Tun Perak and Jalan Petaling (Chinatown) area.

Within City Centre (WCC) – Other city centre location not within the CBD area. The area is divided into two:

a. Situated to the north of the CBD, i.e., covering Jalan Raja Muda Abdul Aziz, Jalan Raja Abdullah, Jalan Pahang, Jalan Putra and Jalan Sultan Ismail area.

b. Situated to the south covering Jalan Maharajalela, Jalan Kinabalu, Jalan Hang Jebat, Jalan Hang Tuah and Jalan Syed Putra.

Suburban – this is the area other than the ones mentioned above. The area is not within the city centre; it covers Damansara, Cheras, Gombak, Kepong and Jalan Ipoh.

Kuala Lumpur City Hall (KLCH) – local authority for the Federal Territory of Kuala Lumpur. It was set up in 1972 together with the announcement of Kuala Lumpur as the first city in Malaysia.

National Property Information Centre (NAPIC) – A centre under the Department of Valuation and Property Services, Ministry of Finance; responsible for collecting and collating information related to property industries.

The National Valuation Institute (INSPEN) – An institution under the Department of Valuation and Property Services, Ministry of Finance; responsible for the enhancement of knowledge and expertise of human resources in the real estate industry through training, research and education with respect to valuation and property services.

1.11 THESIS OUTLINE

The thesis is presented in eight (8) chapters. Chapter One provides the introduction to the thesis. It presents the introduction, research gaps, statement of problems, research questions, research objectives, research methodology, significance of the study, scope of study, limitation of study, definition of terms and thesis outline.

Chapter Two presents a descriptive overview of the office market in Kuala Lumpur. It dwells on office market information comprising the status of demand and supply as well as occupancy status at purpose built office buildings in Kuala Lumpur. It also describes the profile of office buildings in the study area and the profile of office tenants according to the business sectors defined in the Malaysian Standard Industrial Classification (MSIC) 2008.

Chapter Three provides a review of the literature on consumer decision making and office occupation, which covers the conceptual framework of this study. It also covers the topic of previous research on office occupation and consumer decision making; the literature mapping past research, and gaps in the research; overview of consumer preference measurements; the selection of scope for the study; and finally the conceptual approach to the development of the Tenant Office Space (TOS) framework.

Chapter Four provides an overview of Multi-criteria Decision Making (MCDM) techniques. It covers the description of the different tools used in MCDM and provides an insight into the various techniques and tools, and finally justification for why Analytic (AHP) is chosen in the study.

Chapter Five focuses on the research design and conceptual framework. It describes the approach to the study. The preliminary study covers the Delphi Approach design, and data collection. The method of analysis and the research plan of approach are presented before the preliminary study. After the preliminary study, this chapter describes the main study which covers pilot test, data collection, method of analysis, statistical method of analysing the data, analysis of the weights through AHP and evaluation of the validity and reliability of instruments. The last part is presented by the operationalisation of the indicators of the

factors with the results of relative factors' weights of the tenant sectors for the development of tenant office space (TOS) framework; and finally the summary of this chapter.

Chapter Six provides the results of the preliminary study that provided the data analysis and the selection of important factors to be used in the main study. The main study presents the following results and analysis of data: the data collection results; profile of the respondents; information on the selected office buildings' occupancy; the selection of important factors through principal component analysis and important index; checking for the reliability of the instruments used; assessment of factors availability indicator; and the derivation of factors' weights through AHP. The last part of this chapter presents the results.

Chapter Seven presents the discussion of the tenants' preferences with regard to the important factors; the relative importance through weightage derived from AHP for the three (3) main tenant sectors; comparison of the relative weights among the three tenant sectors; assessment of relative factor importance and the availability indicator for each factor; framework development; and its assessment. The last part summarises the discussion of the framework development.

Chapter Eight concludes with a final discussion of this study, together with an examination of its limitations, and recommendations for future research. This chapter ends with a discussion on the theoretical and practical contributions and suggestions for future research.

Figure 1.1 provides the overall structure to this research and the various processes.

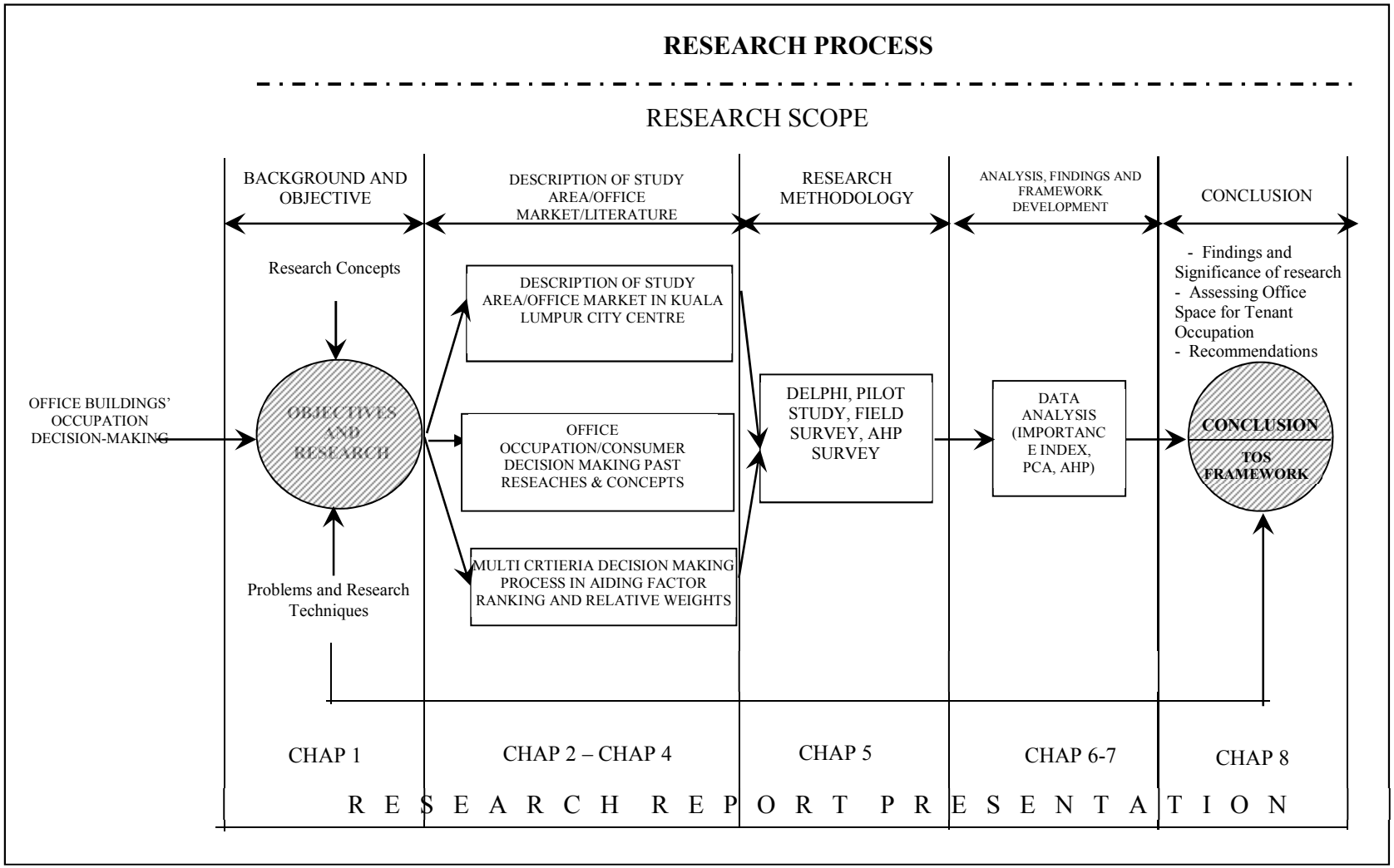


Figure 1.1 : Overall Structure and Processes for the Development of TOS framework
Source: Adapted from Ramly A (1995), *Pembuatan Keputusan Dalam Proses Pengenalpastian Projek Perumahan Sektor Awam*, Unpublished PhD thesis, USM, Penang

CHAPTER 2

OFFICE OCCUPATION IN KUALA LUMPUR

2.1 INTRODUCTION

The ability to identify suitable tenants to occupy available office space is crucial to stakeholders, namely the property investors, developers, owners and managers. While the current office market in Kuala Lumpur has been showing a continuous demand improvement over the years since the 2007 financial crisis, many property consultants have raised concerns over the oversupply conditions (CB Richard Ellis, 2010; DTZ, 2010; Colliers International, 2010). This has raised concerns about occupancy levels and thus this study may assist in making an assessment of the probable important factors and criteria for tenants' preferences for office space.

In dealing with the office occupation situation, this chapter will provide an overview of Kuala Lumpur as the capital city of Malaysia as well as the main office locations defined within. This overview will also provide the description and the office market performance of the various office locations within Kuala Lumpur, with a specific focus on the city centre, the study area. This chapter is organised as follows: Firstly, section 2.2 provides a description of Kuala Lumpur as the commercial centre of Malaysia. Section 2.3 provides a description of the study area, i.e., Kuala Lumpur city centre. Section 2.4 shows the performance of the current and future office markets with respect to demand, supply and occupancy in the respective locations. Subsequently, a brief description of the profile of office buildings in the city centre is provided in Section 2.5; and finally in Section 2.6 the

tenants' profiles according to the industry classification at the selected office buildings within Kuala Lumpur city centre will be described.

2.2 KUALA LUMPUR, THE COMMERCIAL CAPITAL OF MALAYSIA

Kuala Lumpur, the financial and commercial capital of Malaysia, encompasses an area of 243 square kilometres and had a population of about 1.625 million in 2005 (Draft Kuala Lumpur City Plan 2020). It is strategically located as the core of the larger planning entity of the Klang Valley (see Figure 2.1). Kuala Lumpur started out as a tin mine settlement in 1867 and played its role as a trading post. Its expansion was driven by the increase of tin prices and the expansion of the rail and road network. Soon after independence in 1957, Kuala Lumpur underwent rapid economic development and the rate of urbanisation increased. During the 1960s and 1970s, it had portrayed its position as an important trading and business centre. The physical importance of a centre of trading in business is manifest through the formation of The Golden Triangle Area which is full of international hotels, offices and commercial blocks.

The original Central Business District remains as the centre of trading and business with colonial economic features. In the Kuala Lumpur Structure Plan 1984, the city centre was identified as a Centre Planning Area encompassing an area of 18,125,660.4 square meters (Morshidi & Suriati, 1998). Until the end of the 70s, the financial and trading activities were focused in an area known as the Centre Trading Area or the Centre Business District (Morshidi & Suriati, 1998). The area was gazetted in tandem with the Comprehensive Development Plan No 1039 in 1970 and covered an area of 2,031,543.8 square metres. The

"internal area" within the Central Planning Centre has identifiable distinct features associated with history besides having historical colonial trading and business features (Morshidi & Suriati, 1998). The office buildings were mainly concentrated within the Golden Triangle Area. Beside the physical expansion within the city centre, a business area was also developed outside the Central Planning Area.

Until the middle of the 1980s, the development of Kuala Lumpur was guided by the Structure Plan in its effort to face the challenges in transforming Kuala Lumpur into a modern city as well as putting in place a well-balanced systematic development strategy. The era of the globalisation process was felt at the end of the 1980s. At the height Kuala Lumpur's rise, before the Asian Crisis in 1997, the city had become the host to a number of foreign banks. Most of the financial institutions are located within the Central Planning Area. Despite the financial crisis in July 1997, the number of foreign banks operating in Malaysia has not dropped. As of September 2011, there are twenty four (24) commercial banks in Malaysia, of which sixteen (16) are foreign-based banks (www.bnm.gov.my).

During the 1870s, the two main economic activities for Kuala Lumpur were mining and trading. In 1999, finance, insurance, real estate and business services encompassed 36.3 percent of the Kuala Lumpur Gross Domestic Product (GDP) (Morshidi, 2000). By 2009, the overall service sector contributed 58% towards Malaysia GDP (EPU, 2010). It is interesting to note the depletion of the manufacturing sector, which contributed only 7.9 percent to the city economy (Morshidi, 2001). This economic base has transformed Kuala Lumpur's employment structure. From an analysis made by Morshidi *et al*. (2001) of the producer services located in Kuala Lumpur, the following have more inclination to be in

the city centre than any other parts of the city. They are accounting, banking, insurance and finance, secretarial and administration, and legal services. However, the concentration will always depend on the ability to pay for the land and rent, which command higher rates. The concentration of the activities of such services in a particular location occurs when there is also concentration of the other main economic activities at the same location. However, it has been postulated by Harvey (2000) that as the distance increases from the city centre, the existence of the economic activity deceases. This phenomenon can be observed along the development away from the city centre covering the areas identified as Within City Centre (WCC) and the suburban area of Kuala Lumpur.

In general terms, Kuala Lumpur's economy can be characterised as an economy experiencing rapid transition to tertiary production as opposed to manufacturing production (Morshidi & Suriati, 1999). Based on the findings of Morshidi and Suriati (1998), the globalisation of economic activity in Kuala Lumpur - translated as being the shift to services and finance on a global scale - has triggered a shift in the economic base especially in the producer services activities (Morshidi, 2000).

The total employment in Kuala Lumpur in the year 2000 was estimated at around 838,400 (Kuala Lumpur Structure Plan 2020). The economic structure of Kuala Lumpur and the entire Kuala Lumpur Metropolitan Region (KLMR), in terms of broad sectoral distribution of employment, is given in Table 2.1. The tertiary or service sector forms the largest component of employment in Kuala Lumpur, representing about 83.0 percent of the total compared to 71.0 percent in the KLMR. Based on the Eighth Malaysia Plan (2001-2005), it is estimated that Kuala Lumpur accounts for the major portion, or 58.0 percent, of the

service sector jobs within the KLMR. The tertiary sector comprises finance, insurance, real estate & business services, wholesale & retail trade, restaurant & hotel, transport, storage & communication, utilities, personal services and government services.

Table 2.1: Distribution of Employment by Major Sectors in Kuala Lumpur, its Conurbation and Malaysia, 2000.

Sections	Kuala Lumpur		Kuala Lumpur and its Conurbation		Malaysia	
	(000)	%	(000)	%	(000)	%
Primary	9.0	1.1	55.7	3.3	1,448.7	15.6
Secondary	131.3	15.7	441.7	25.9	3,313.3	35.7
Manufacturing	88.1	10.5	337.7	19.8	2,558.3	27.6
Construction	43.2	5.2	104.0	6.1	755.0	8.1
Tertiary	698.1	83.3	1,208.5	70.8	4,509.2	48.6
Utilities	24.1	2.9	57.2	3.4	75.0	0.8
Wholesale & retail trade restaurant & hotel	144.4	17.2	233.0	13.7	1,584.2	17.1
Transport, storage and communication	66.5	7.9	178.7	10.5	461.6	5.0
Finance , Insurance, real estate , business services	202.8	24.2	309.7	18.2	508.7	5.5
Personal services	125.7	15.0	256.3	15.0	898.7	9.7
Government services	134.6	16.1	173.7	10.2	981.0	10.6
Total Employment	838.4	100	1,709.9	100	9,271.2	100
Population	1,423,900		4,207,200		23,266,00	
Employment/ Population Ratio	0.59		0.41		0.40	

Source: Estimation based on Eighth Malaysia Plan (Kuala Lumpur Structure Plan, 2020)

The employment to population ratio in Kuala Lumpur is higher at 59.0 percent compared to 41.0 percent in the remainder of the KLMR and 40.0 percent in the country as a whole.

Malaysia's development strategy has taken on a new focus where the services sector is targeted to spearhead economic growth over the next 10 years (Mamat, 2009). The sector's contribution to GDP is targeted to increase to 66.5% in 2020, valued at RM437.6 billion from 55% in 2008 when it was valued at RM290.5 billion. The government of Malaysia's

service-focused strategy follows a development path that has been well adopted by many developed countries.

A good indicator of growth prospects is the level and direction of investments taking place. Investments in services totalled RM66.4 billion in 2007 and RM50.1 billion set by the Third Industrial Master Plan (2006-2020). Domestic investments make up more than 85% of investments in the services. Initiatives were taken by the Malaysian government to liberalise 27 subsectors of services, closely followed by the liberalisation of selected financial services and the deregulation of Foreign Investment Committee guidelines in 2009. This initiative was taken to bring in new capital, expertise and technology and contribute to employment creation. Market openings being undertaken by many other countries have increased the opportunity for doing business in the services sectors. During Malaysia's Tenth Plan period (2011-2015), the focus will be on the economic growth efforts on National Key Economic Areas (NKEA), which include oil & gas, financial services, information & communication technologies, business services, education, and greater Kuala Lumpur. Out of these areas, three sectors have performed significantly for Malaysia's economy: in 2009, the oil & gas sector contributed 13.1% of GDP; the financial sector contributed 11.7%; and the ICT sector accounted for 9.8% of the GDP (EPU, 2010).

2.3 KUALA LUMPUR CITY CENTRE – STUDY AREA

The area identified as the Kuala Lumpur city centre has been chosen as the study area. This area comprises the traditional centre as in other cities in the world as well as the so-called

'Golden Triangle of Kuala Lumpur', which comprises top quality buildings, including the PETRONAS Twin Towers, the former tallest buildings in the world.

The motive for the selection of Kuala Lumpur city centre has been the growth of sub-centres within Kuala Lumpur, which raise the question of the role of Kuala Lumpur as the main centre of trade and business. The city centre has undergone a tremendous transformation since it first started as the centre of trade, building on its 1867 position as a tin mine settlement. It has since then progressed to attain a city status in 1972. The manifestation of its physical function as a centre of business and office location activities is through the emergence of the Golden Triangle area (the area bounded by Jalan Ampang, Jalan Sultan Ismail and Jalan Bukit Bintang) which is built upon with international hotels and office and commercial blocks. At the same time, the previous Central Business District (CBD) of Kuala Lumpur, which used to be the traditional city centre, remains as the business and trade area with colonial economic features (Morshidi, 2000).

In Malaysia, Kuala Lumpur city centre has been defined in different ways by various parties. The City Hall of Kuala Lumpur has defined the area as encompassing the central business location covering an area of 18,125,660.4 sq. meters (see Figure 1). From the perspectives of the property professionals on the other hand, the definition varies. The definition by the National Property Information Centre (NAPIC), Department of Valuation and Property Services, Ministry of Finance, Malaysia has identified the office buildings location in Kuala Lumpur as: Central Business District (CBD), Golden Triangle (GT), Within City Centre (WCC) and Suburban (SU) area. The Central Business District (CBD), identified as the older part of Kuala Lumpur city, was gazetted in accordance with the

Comprehensive Plan No 1039 in 1970. The office buildings located within the area were mainly built before the 1980s, although some buildings have undergone refurbishment.

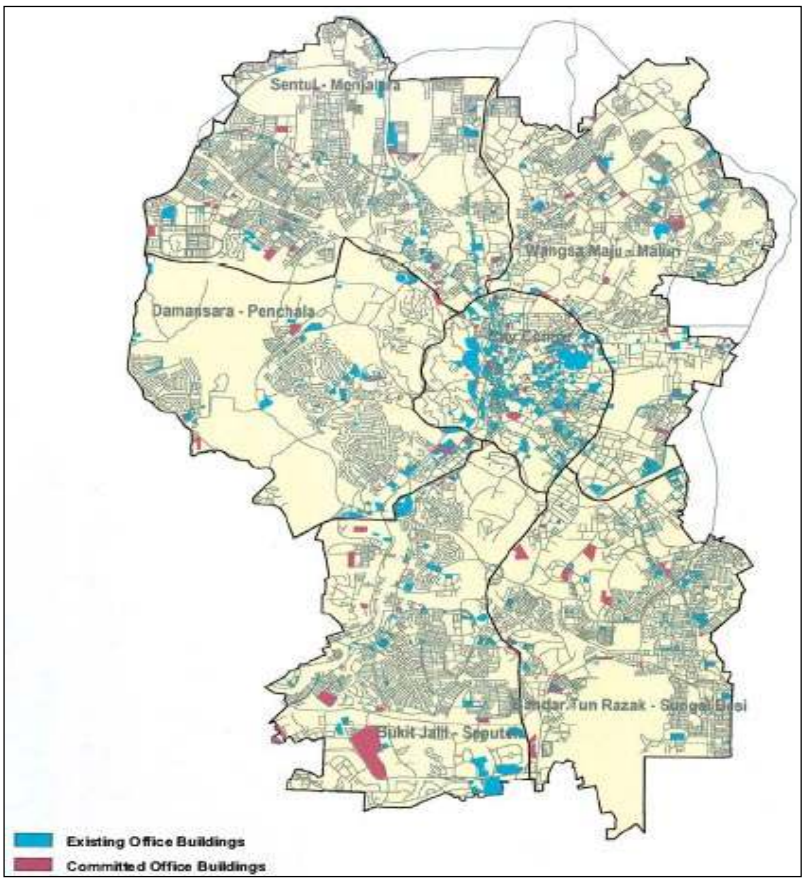


Figure 2.1: Existing and Committed Office Area
(Source: Kuala Lumpur Structure Plan, 2020)

The definition of Kuala Lumpur City has now changed to meet the aspiration of the government to be a world class city. The centre which was formerly referred to CBD now includes areas bounded within the Golden Triangle and Within City Centre (WCC) (NAPIC, 2009). For this study, the definition by City Hall Kuala Lumpur shall be adopted.

The perceived need to influence office location decision is readily available from the Malaysian Planning documentation, the following extract being typical of the kinds of

generalised policy objectives incorporated in the Structure Plan such as: i) to promote Kuala Lumpur as a choice location for international organisations and business entities to establish their regional offices and headquarters, and ii) to create a technologically advanced city, especially in all fields of building technology and design as well as information and communication technology (Kuala Lumpur Structure Plan, 2020). Much of the policy making and planning initiatives are aimed at development companies and others that supply office premises, in the expectation and hope that these are able to accurately assess the requirements of the occupiers. An alternative to such a supply orientated approach, an examination of the locational motives of the occupants of the office buildings, is advocated here.

While older office buildings located in secondary location or on the fringe of Kuala Lumpur city centre or CBD area are said to be more susceptible to being left vacant due to unpopular office addresses and poor building images, similar buildings located close by the Kuala Lumpur City Centre (KLCC), an area within the Golden Triangle area, gained from the strategic location and continued to enjoy sustainable occupancy rates (Rahim & Co, 2006).

The Structure Plan 2020 by Dewan Bandaraya Kuala Lumpur (Kuala Lumpur City Hall) has made specific plans to make Kuala Lumpur a premier city and the capital of a nation with a highly trade oriented economy that aspires to be developed by the year 2020. In aspiring to make Kuala Lumpur a world class city, one of the goals mentioned in the Structure Plan 2020 is to enhance its role as an international commercial and financial centre. However, the development strategy for the city centre is for moderate growth in order not to exacerbate the problem of oversupply of commercial space in the city. The

motive to achieve a world class status for major cities in the region are many, including a national pride for most governments, in addition to the fact that it is seen as an answer to the critical problem of making a successful transition from low wage assembly platforms to technically advanced production and high order corporate service centre (Douglass, 2000). Eight (8) functions are commonly associated with world class cities and they are: finance (banks, stock, real estate and insurance), transnational corporate headquarters function (commodity production/distribution), global services (education, high technology producer services), transportation, information, political/ideological, culture and holding world events (Short *et al*., 1996).

Drawing from the above aspiration towards meeting the visions of turning Kuala Lumpur into a world class city, the Structure Plan 2020 highlighted concerns regarding the commercial development. They are the overconcentration of office buildings in the city centre; and significant quality of older buildings, included those vacated by the relocation of government offices to Putra Jaya which are deficient in basic information communication technology (ICT) facilities.

It has been generally noted that in most cities in the world, the central business district (CBD), or the city centre, is referred to as the heart of the city where there is a concentration of firms and office employment. The central business district is said to be dominated by a limited number of competitors in the urban system, and the dominant land uses are associated typically with major banks, corporate office buildings, department stores, theatres, and other leading business, commercial, or entertainment uses (Kleinberg, 1995). Thus, CBD is easily distinguishable by its centrality, easy accessibility and

clustering of up market commercial organisations and tertiary employment. Information is vastly collected, processed and disseminated in this area. Thus CBD is a highly dynamic place that is normally associated with fast pace of life (Tang, 1999).

Baum *et al.* (2000) had studied the competitiveness of cities and its influence by the characteristics of their office markets. This study discovered that, whilst a firm's decision to locate in a particular city may be well driven primarily by the quality of labour markets, presence of customers and competitors and access to capital markets, the cost and quality of real estate will be a major factor as well. More importantly, the characteristics of the office markets must affect business efficiency – both for incoming firms and those already based in the city.

2.4 KUALA LUMPUR OFFICE MARKET

2.4.1 Kuala Lumpur Office Market Performance

By the first quarter of 2011, there is approximately 6.86 million square metres (73.8 million square feet) of office space in Kuala Lumpur (NAPIC, 2011). Out of this amount, 78.8% of the space is located within the area demarcated by the City Hall Kuala Lumpur as the Kuala Lumpur City Centre. The average occupancy rate of the office space in Kuala Lumpur is 80%, while the average occupancy rate of the office space in the city centre (as defined in the study) is 81% (NAPIC, 2011). The occupancy rate of office space within the areas in Kuala Lumpur as defined by NAPIC shows varying figures as follows:

Table 2.2: Occupancy Rate of Office Space in Kuala Lumpur

Defined Area	*Occupancy Rate*
Golden Triangle	*83.4%*
Central Business District	*84.1%*
Within City Centre	*75.9%*
Suburban	*78.2%*

(Source: NAPIC, 2011)

There is a growing supply of office space in recent years which may dampen the occupancy rates and rental rates. An observation of the supply trend from 1990 to 2010 is illustrated in Figure 2.2:

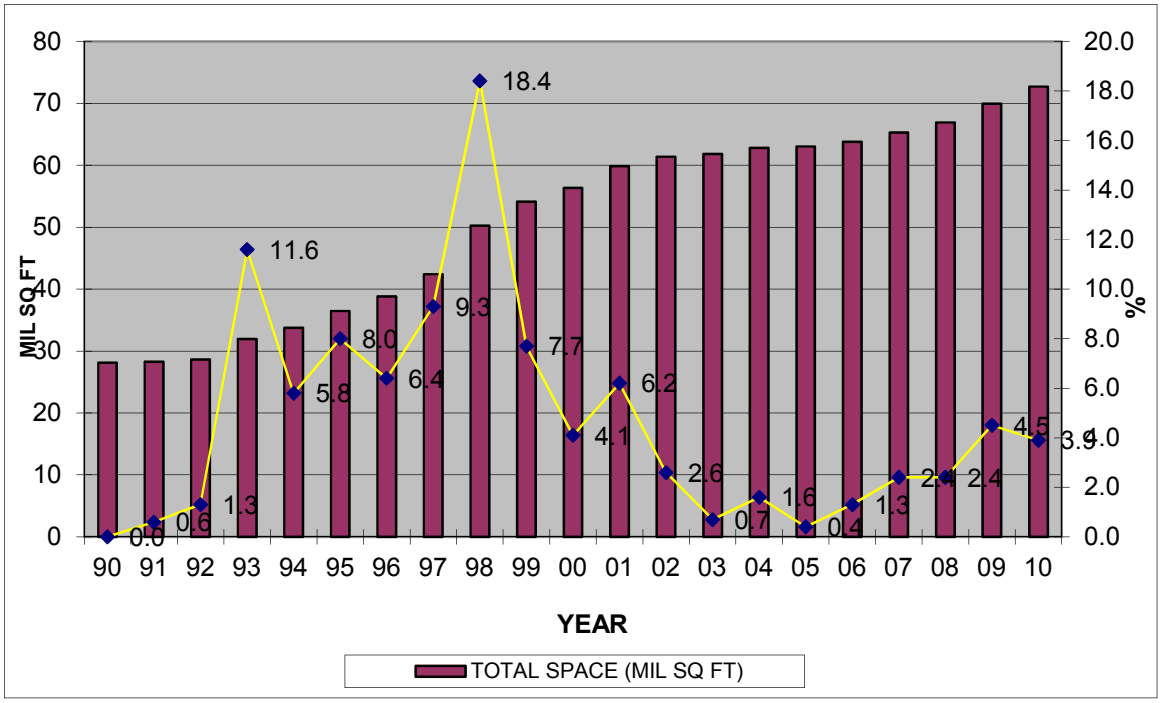


Figure 2.2 – Existing Supply and Change in Supply: 1990 to 2010
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

Figure 2.2 shows that existing and changes of supply of office space in Kuala Lumpur from 1990 to 2010. There was a sharp rise of office supply between the periods 1992-1993 and 1997-1998. Then there was a fall in supply due to the financial crisis in 1998. Since then supply has risen marginally, rising the highest in 2001, but being almost unchanged in

the following years, with an increment of 0.1 % in 2005. Between 2003 and 2004, the existing office space contracted as adjustments were made to account for the change in category of use, demolition of buildings or change in total space (as advised by data custodians via NAPIC). From 2005, the supply began to pick up but at very marginal rates. Supply was almost unchanged in 2005 (+ 0.1%). In 2006 and 2007, the office market recorded marginal increases in supply at 1.3% and 1.6% respectively. However, between the years 2008-2010, the supply of office space has increased between 2.4% and 4.5%.

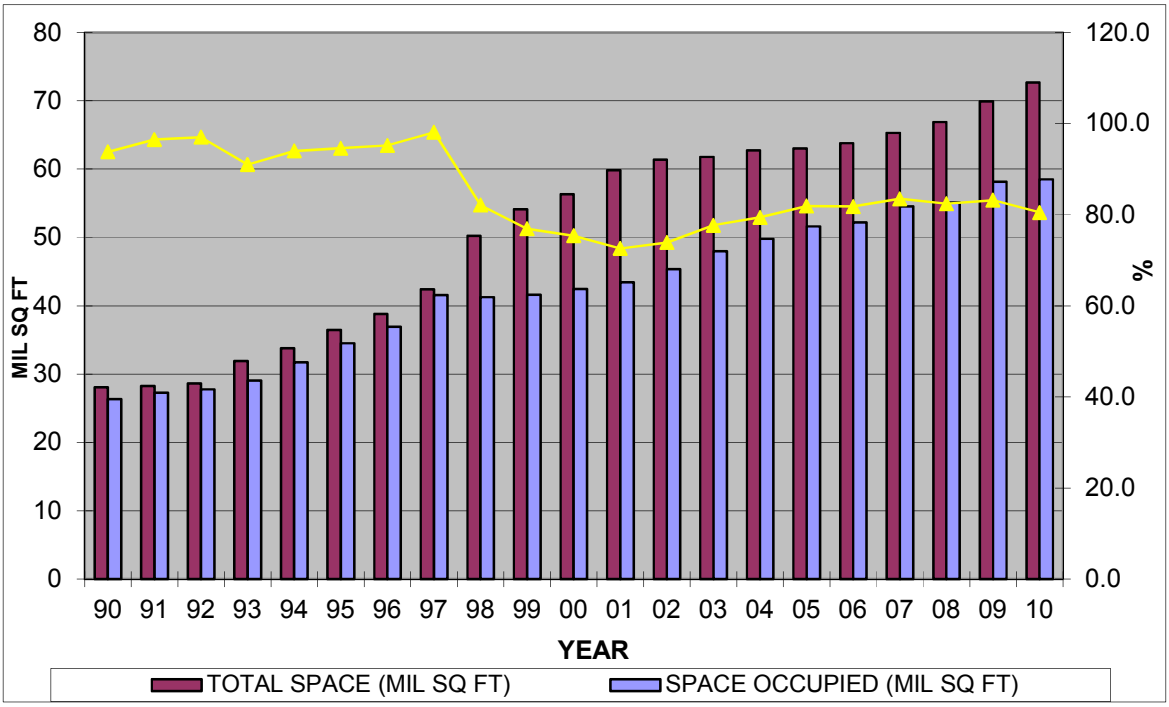


Figure 2. 3: Change in Supply, Take-up and Occupancy Rate of Office Space
((Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

The demand for office space is measured by the occupancy rate and the take-up space of office buildings. Figure 2.3 shows the interaction between year-to-year change in supply and change in take-up as well as its impact on the occupancy rate. In 1997, the occupancy rate peaked at 98.1%. However, a year later when the financial crisis set in, as huge supply

entered the market and take-up declined immensely, the occupancy rate dropped to 82.1%. The subsequent three years saw a further downtrend of occupancy rates as spaces were still abundance and the market took a longer time to absorb these spaces. In 2002, after five consecutive years of decline, occupancy rate began to pick-up. The adjustments of supply in 2003 and 2004 enabled occupancy rates to be sustained at higher levels. In 2005, as take-up improved, occupancy rate breached the 80.0% mark to record at 80.5%, which sustained until 2006. In 2007, occupancy rate stepped up to 81.8%. However, due to the global economic slowdown, occupancy rate has stabilised at 80% within 2008-2010.

2.4.2 Supply and Demand Patterns of Office Space by Location in Kuala Lumpur

An observation of the supply and demand of office areas within Kuala Lumpur reveals varying patterns. According to the areas defined by the National Property Information Centre (NAPIC), the office market in Kuala Lumpur is demarcated into four locations, which are the Golden Triangle (GT), Central Business District (CBD), Within City Centre (WCC) and Suburban (SU). Cross-sectional analysis by location and various development stages shows pertinent movements over the years. For example, the Suburban area was the leading supplier of office space from 2007 until 2009, superseding the CBD, which had previously been the majority holder of private office space. The office supply in the Golden Triangle and Jalan Ampang, where potential sites for development are scarce, stagnated since 2003. However, from the years 2010 until 2011, the GT and WCC have been the leading suppliers of office space into the city centre. The existing space in CBD remains relatively stable although there has been a slight increase of overall supply in recent years.

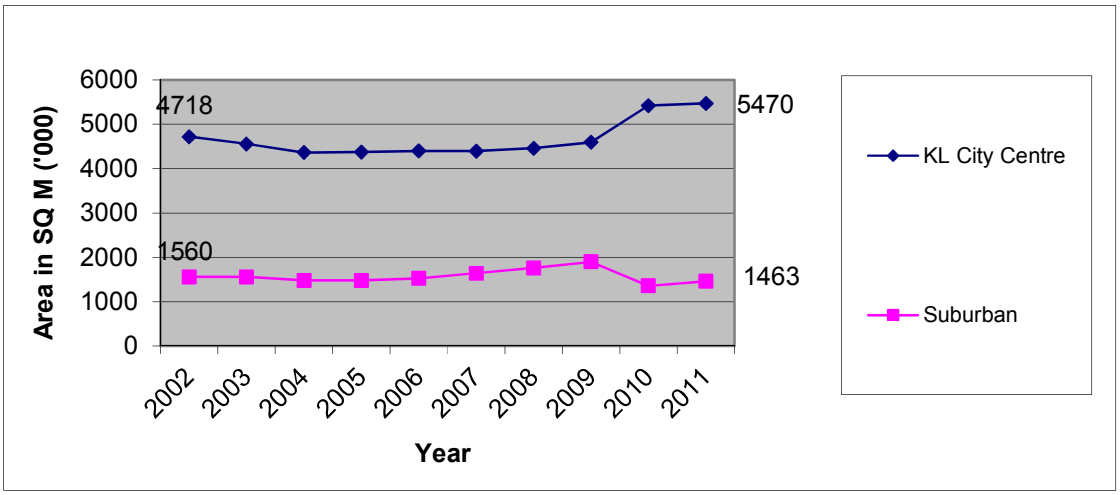


Figure 2.4: Total Floor Space for Office Buildings in Kuala Lumpur
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

Figure 2.4 and Figure 2.5 show the movements in the existing supply of office space in Kuala Lumpur in the past decade. The supply saw prominent movements in the Suburban office market from 2002 but the supply has fallen from 2009. There has been a drastic increase of office space in the office buildings within Kuala Lumpur city centre from 2009 with a sharp growth of 48%. On the other hand, the Suburban area saw a decline of office supply in the area in 2010, when there was a drop of 75%.

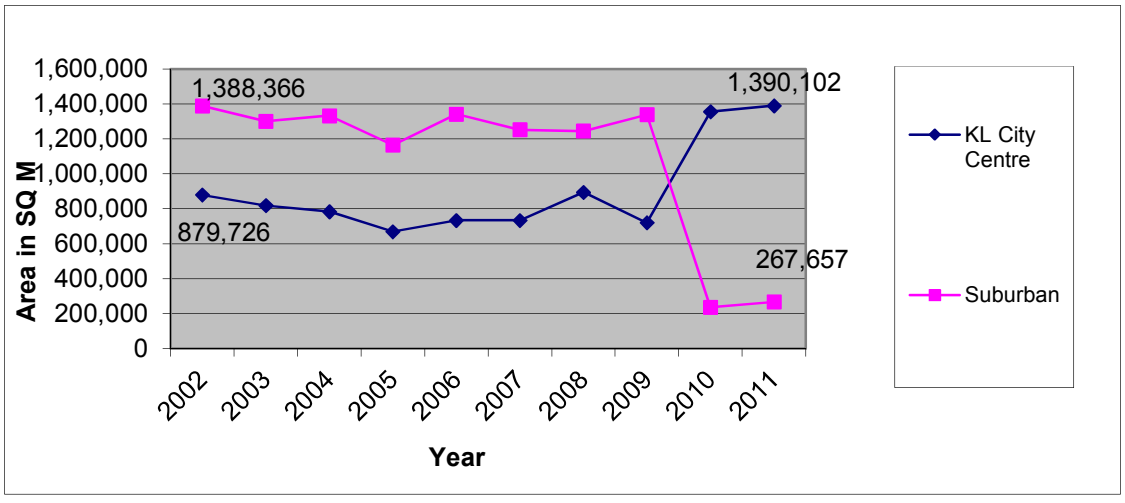


Figure 2.5 –Supply of Office Space by Major Location in Kuala Lumpur
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

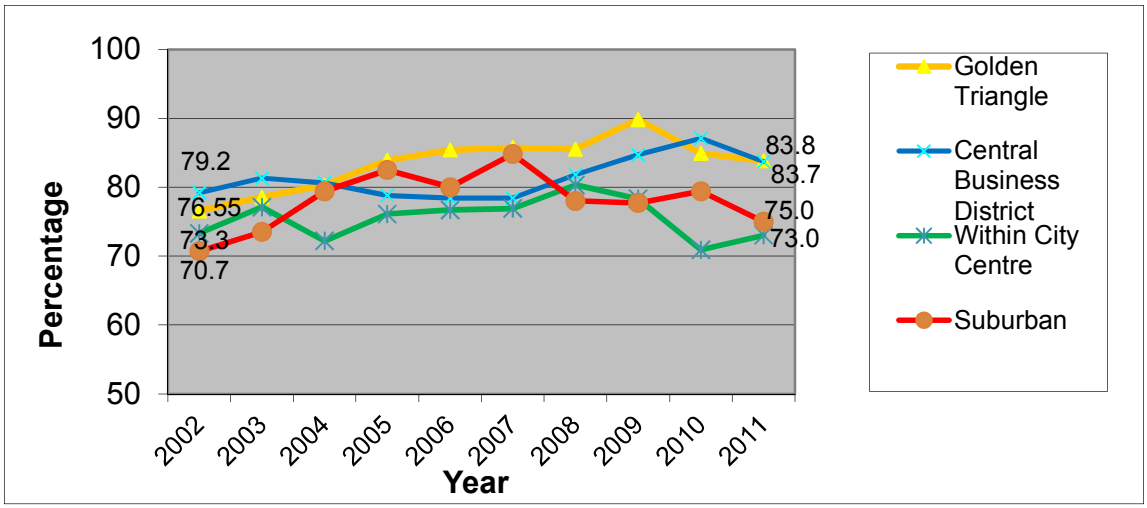


Figure 2.6: Occupancy Rate for Office Buildings in Kuala Lumpur
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

As shown in Figure 2.6, the occupancy rate for office space within the Kuala Lumpur office market showed an encouraging rate of over 80% until 2008. However, with the increase of office supply within the Kuala Lumpur city centre area from 2008, the occupancy rate has shown a decreasing rate since 2010. The area within the GT fell slightly in 2008 before picking up again in 2009. However, in the first quarter of 2011, the rate has fallen to 82.6%. Suburban area has seen a volatile movement of the occupancy rate when it peaked at 86.2% in 2007 before falling to around 80% in 2009, picked up in 2010 but fell again in the first quarter of 2011 to 77.8%. The CBD saw a rise in the occupancy rate from 2007 to 2010 before it fell to 84.6% in the first quarter of 2011. The occupancy rate in WCC rose in 2008 at 83%, then continuously fell to 74% but picked up to 75.9% in the first quarter of 2011.

With the announcements by the government of the redevelopment of Greater Kuala Lumpur into a world class city as one of the key strategies of the Economic Transformation Programme (ETP) in 2010, it can be seen that there will be an increase of

office supply in the area. Table 2.3 contains a summary of the commercial projects identified to be located within the Kuala Lumpur city centre:

Table 2.3: The Commercial Projects Planned Within Kuala Lumpur city centre

Location/Site	Project Name	Developer	Land Area (acres)	Project Cost (as announced)	Possible Total Gross Floor Area	Likely Development Period
Bukit Bintang East	Kuala Lumpur International Financial District (KLIFD)	1Malaysia-Mudabala Development	85	Over RM15 Billion	Over 1.86 Million sq m (20 Million sq ft)	15-20 years
Kampong Baru	Yet Un-named	Kg Baru Development Corporation	233	Not Reported	Over 5.57 Million sq m (60 Million sq ft)	As yet, undeterminable
Jalan Hang Tuah	Warisan Merdeka	PNB	55	Over RM3 Billion	Over 0.93 Million sq m (10 Million sq ft)	10-12 years
Pudu Jail Site	Bukit Bintang Commercial Centre	UDA	20	Over RM 5 Billion	Over 0.46 Million sq m (5 Million sq ft)	15-20 years

(Source: C H Williams, 2011)

The office sector is heading towards a very competitive market environment. The market is expected to have an immense contribution to new supply if the mega projects are launched.

2.5 PROFILE OF OFFICE BUILDINGS IN KUALA LUMPUR CITY CENTRE - STUDY AREA

According to the NAPIC's Stock Report 2011, the number of office buildings within the main office areas of the defined area of Kuala Lumpur city centre as of the fourth quarter of 2010 is 310. Out of this figure, 276 are private office buildings. The total office space for all the office buildings is 5.4 million sq metres (58 million sq ft) out of which 5.1 million sq metres (54.8 million sq ft) is supplied by private office buildings. Thus, out of

the total office space area supplied in Kuala Lumpur, 94% is supplied by private office buildings.

As this study is focused on tenant occupation of private office buildings, the space provided by these buildings shall be described. An examination of the distribution of the private office buildings according to the office area in Kuala Lumpur is shown in Figure 2.7 and Figure 2.8.

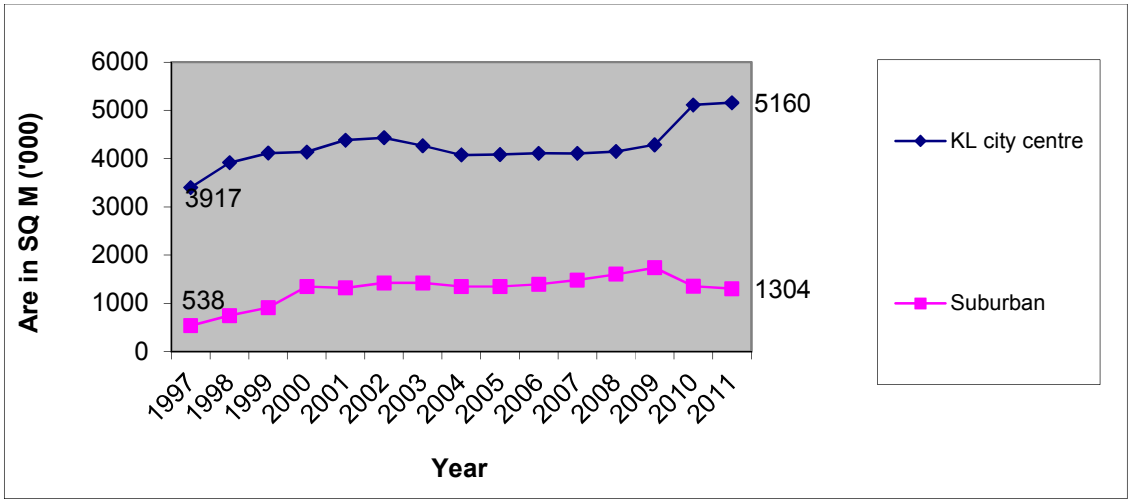


Figure 2.7: Total Floor Space for Private Office Buildings in Kuala Lumpur
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

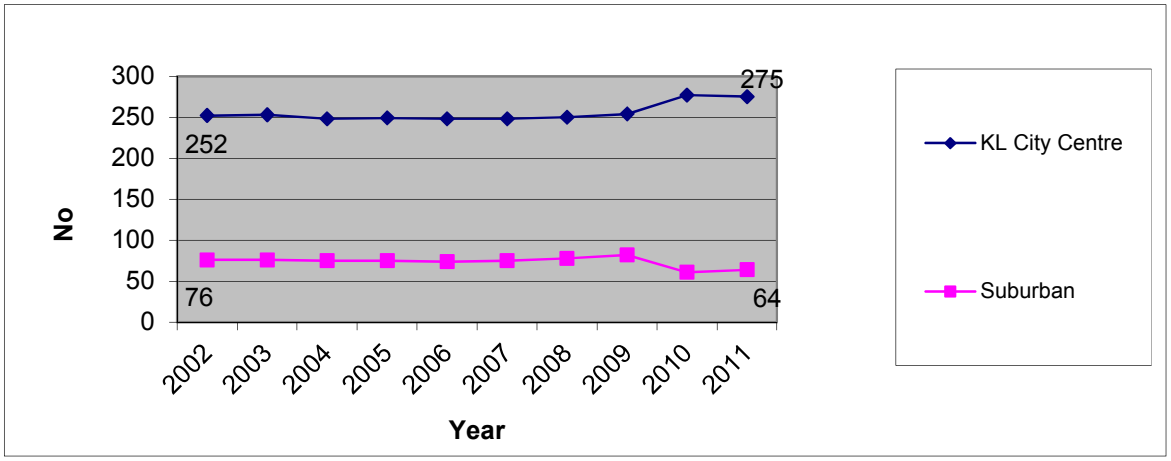


Figure 2.8: Distribution of Private Office Buildings in Kuala Lumpur
(Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

From Figure 2.7 and Figure 2.8, it can be noted that there has been a low growth in the supply of private office buildings since 2002. However, in 2010 there was a 20% increase of total area supplied as well as an increase by twenty three (23) of office buildings from the previous year. Figure 2.9 shows the breakdown of the numbers of office buildings within the various areas in Kuala Lumpur.

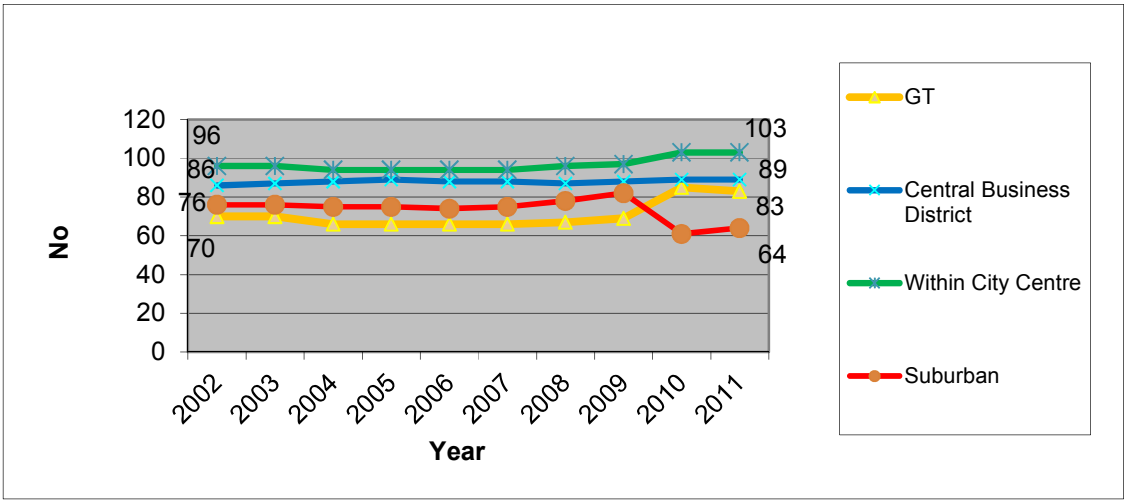


Figure 2.9: Distribution of Private Office Buildings within Kuala Lumpur office area (Source: Data compiled by researcher from various NAPIC publications, 1990-2011)

Kuala Lumpur city centre has the largest number of office buildings in Kuala Lumpur. Out of all the private office buildings in the city centre, sixty-one (61) have been selected in this study. They are categorised as the top grade office buildings based on office classification criteria research conducted by Mohd, *et al*., (2010) to determine the pertinent information with regard to the floor area occupied by tenants in these sixty-one (61) office buildings. The total floor area (as given by the Department of Master Plan, City Hall, Kuala Lumpur) within the selected buildings is 2.861 sq metre (30.8 million sq ft), out of which approximately 40% is occupied by tenants. Based on the defined area in the study, the distribution of the buildings (as at 2010) is as follows:

Table 2.4: Distribution of the Buildings and Floor Area of the Buildings in the Study

Area	Total Number of Private Office Buildings in Kuala Lumpur city centre	Total Floor Area sqm (sf)	Total Number of Private Office Buildings in the study	Total Floor Area of Buildings in the study sqm (sf)	Total Lettable Space of Buildings in the study sqm (sf)	Total Floor Area Occupied by Tenants at Buildings in the study sqm (sf)	Total Floor Area – vacant or occupied by non-tenants in the study sqm (sf)
Golden Triangle (GT)	83	2.03 (21.9) Million	41	1.94 (20.9) Million	1.43 (15.4) Million	0.69 (7.5) Million	0.73 (7.9) Million
Central Business District (CBD)	89	1.19 (12.8) Million	12	0.59 (6.3) Million	0.32 (3.4) Million	0.26 (2.8) Million	0.055 (0.6) Million
Wihin City Centre (WCC)	103	1.86 (20.1) Million	8	0.33 (3.6) Million	0.24 (2.6) Million	0.21 (2.3) Million	0.018 (0.2) Million
Total	275	5.09 (54.8) Million	**61**	2.86 (30.8) Million	1.99 (21.4) Million	1.17 (12.6) Million	0.81 (8.7) Million

(source: NAPIC, 2010; Master Plan Dept, City Hall; this study, 2010)

The distribution of the office buildings within the study area is shown in Appendix A.

It is observed that the out of the total area occupied by tenants of the office buildings in Kuala Lumpur city centre, the highest percentage of the floor area is occupied by tenants in the Golden Triangle area. However, of the comparison of the percentage of occupancy by tenants against the available floor area in each respective office area, the WCC has the highest percentage of 88%. The main international business area, i.e., Golden Triangle area, is occupied by 48% of tenants for its available space, while the rest of the floor area is either owner-occupied or vacant. According to the Commercial Property Stock Table Quarter 1, 2011 (NAPIC, 2011), the overall occupancy rate of the private office buildings at the Golden Triangle area as of 2010 is 84%.

2.6 PROFILE OF OFFICE OCCUPANCY BY TENANTS IN KUALA LUMPUR CITY CENTRE – STUDY AREA

A survey to gauge tenant occupancy of the selected office buildings in the study was conducted from November 2009 to January 2010. The information on the occupancy of tenants according to the industry classification as defined by the Malaysian Standard Industrial Classification (MSIC) 2008 was gathered from the buildings managers. The activities within the scope of services conducted at office buildings were chosen within the MSIC definition. The distribution of the tenant occupancy in the respective office areas is summarised in Table 2.5 below:

Table 2.5: Distribution of the Office Space Occupied by Tenants according to Service Sectors

Type of Industry	Golden Triangle		Central Business District		Within City Centre		Total Floor Area sqm (sqf)	(%)
	Floor Area sqm (sqf)	%	Floor Area sqm (sqf)	%	Floor Area sqm (sqf)	%		
Banking/Other Financial Services	138,366 (1,489,380)	11.7	56,910.8 (612,588)	4.8	15,580.2 (167,705)	1.3	210,857.7 (2,269,673)	**17.8**
IT, Communication & Media	107,212.6 (1,154,037)	9.1	7,668.3 (82,542)	0.7	44,062 (474,284)	3.7	158,934 (1,710,863)	**13.5**
Mining - Oil & Gas	102,748.7 (1,105,988)	8.7	48,021 (516,899)	4.1	3,317 (35,706)	0.3	154,087 (1,658,593)	**13.1**
Real Estate & Construction	46,865 (504,463)	4.0	12,865 (138,483)	1.1	7,561 (81,386)	0.6	67,292 (724,332)	**5.7**
Professional, Scientific & Technical	79,817 (859,153)	6.8	35,397 (381,015)	3.0	28,685 (308,765)	2.4	143,899 (1,548,933)	**12.2**
Admin & Support/Public Administration & Defence	90,800 (977,378)	7.7	9,840 (105,919)	0.8	12,770 (137,465)	1.0	113,412 (1,220,762)	**9.5**
Government	2,057 (22,141)	0.2	56,407 (607,171)	4.8	41,909 (451,116)	3.6	100,374 (1,080,428)	**8.6**
Education	6,692 (72,030)	0.6	3,606 (38,811)	0.3	7,577 (81,562)	0.6	17,875 (192,403)	**1.5**
Transportation	31,007 (333,763)	2.6	10,776 (115,994)	0.9	28,636 (308,244)	2.4	70,420 (758,001)	**5.9**
Other services & commercial activities	93,237 (1,003,602)	7.9	22,382 (240,922)	1.9	25,522 (274,715)	2.2	141,141 (1,519,239)	**12**
Total	**698,805 (7,521,935)**	**59.3**	**263,874 (2,840,344)**	**22.4**	**215,621 (2,320,948)**	**18.3**	**1,178,301 (12,683,227)**	**99.8**

(source: this study, 2010)

It is observed that Banking/Other Financial Services has the highest percentage of occupied office space among the other service sectors. It also has the highest percentage of occupied office space within the Golden Triangle area. The highest percentage of occupied area in the Central Business District (CBD) is also the Banking/Other Financial Services sector and the Government sector. The sector that mainly occupies the office space at the Within City Centre (WCC) area is the IT, Communication & Media sector. The other two (2) main sectors that occupy the second and third highest of office space are the IT, Communication & Media and the Oil and Gas sectors. The Education sector occupies the least office space in the selected office buildings in the study.

2.7 SUMMARY

This chapter provides an overall description of Kuala Lumpur as the commercial centre, as well as the performance of the office market in Kuala Lumpur. The pattern of supply, demand and occupancy levels was also discussed. The profiles of the selected buildings in the study as well as the tenants' occupying the floor space in these office buildings were also described. The improvement of the supply of office space after the financial crisis in 1997 was small until 2005 but has picked up since then at a rate of 1.3% to 4.5% annually. With the announcements by the government of the redevelopment of Greater Kuala Lumpur into a world class city as one of the key strategies of the Economic Transformation Programme (ETP) in 2010, it can be seen that there will be an increase of future office supply in the area with floor area of approximately 8.361 square metres (90 million square feet). The demand on the other hand dropped after the financial crisis in 1997, but then picked up and had breached the 80% mark, which sustained until 2008.

However, with the increase of office supply within the Kuala Lumpur city centre area since 2008, the occupancy rate has been decreasing since 2010.

A survey of the occupancy of the selected buildings in the study area has revealed the distribution of the different sector of industries at the various office areas in Kuala Lumpur city centre. The three main industry sectors occupying office space in the buildings in the study area are Banking/Other Financial Services; IT, Communication & Media and Oil & Gas.

CHAPTER 3

DECISION MAKING IN OFFICE OCCUPATION

3.1 INTRODUCTION

Past research works covering various aspects of office occupation ranging from location decisions, corporate real estate decisions as well as retention or renewal, and relocation decisions, have studied decision making by office occupiers. While this current research attempts to identify and examine the factors that influence office occupiers' decision making from the tenants' preference perspectives, it would be useful to explore the behavioural decision making nature of office occupiers generally and tenants specifically. In the overall assessment of the criteria chosen by tenants of office occupation of top grade office buildings in Kuala Lumpur city centre, preference will be influenced by the different importance placed by the different categories of office occupiers, as highlighted by Leishman and Watkins (2004).

Section 3.2 of this chapter describes the behavioural aspect of decision making in general and specifically in relation to real estate. The behavioural perspective underpins the methods used in the assessment of the important factors for office occupation. Section 3.3 and Section 3.4 cover consumer decision making and customer preference literature, which provide an overview of the concepts relevant to office occupation decisions, with a view that tenants are consumers of office space; this is the most relevant aspect of the scope and stage of this present study. Section 3.5 provides an overview of the office occupation literature incorporating the focus area of locational decision making and corporate and facilities management perspectives in office occupation decisions, as well as financial and

contractual considerations which were highlighted earlier. Section 3.6 covers mapping of the literature, a method of reviewing literature as outlined by Creswell (2008). The mapping of literature on office occupation is whereby research gaps for this present study are established. Section 3.7 provides an overview of the factors which are highlighted in the office occupation studies; whilst Section 3.8 provides the overview of the scope of the study. Section 3.9 covers the conceptual model of Tenant-Office Space (TOS) framework, which is the framework for office space preference, by tenants in the main sectors of office building in Kuala Lumpur city centre. Section 3.10, the final section of Chapter 3, provides the summary of the chapter.

3.2 BEHAVIOURAL PERSPECTIVE TO DECISION MAKING

The objective of examining the behavioural perspective to decision making is to identify the behavioural dimension as a component in office occupiers' decision making. The behavioural interpretations of decision making are said to be essentially explanatory seeking to represent what actually happens when a decision is made rather than prescribing a theorised model of decision making. Behavioural theory suggests that decision processes are not fully rational and are subject to various heuristics and biases. The decision environment is perceived as dynamic and more chaotic. It is theorised that subjective modes of decision making adapt more quickly than objective modes to the information generated by imperfect decisions generated within such an environment (Krabuanrat & Phelps, 1998; Gallimore, 1994; Gallimore *et al*., 2000)

Of late, there has been a different perspective to property research. The neo classical model of property research has been criticised for reducing human behaviour to a number of

simplified assumptions. It is predicted on the notion that the market comprises rational actors operating with perfect information in an environment of costless transactions. It also assumes that property can be treated as a homogenous commodity and the consumers of space are also homogeneous (Leishman *et al.*, 2003). McMaster & Watkins (2000) are critical of the extent to which this approach circumscribes the scope of real estate research. The scope of limitation of neo urban economics (NUE) was explored and it was argued that the real estate analysts needed to learn more about the market process and in particular it highlighted the need to examine the role of agents in the market, the property search process, consumer decision making, the nature and the flow of the market information, and the way in which prices are set. Leishman (2004) observed that the behavioural agenda, in particular, has begun to raise new questions about the search process in the real estate markets (Baryla *et al.*, 2000); role and influence of agents (Zumpano *et al.*, 1996); and the influence of actors in the valuation process (Gallimore, 1996; Diaz, 1990). On the demand side, the behavioural studies questions the assumptions in the classical urban economic model that firms are homogenous and have perfect information in their location choice decision (Wyatt, 1999; Leishman & Watkins, 2004; Leishman *et al.*, 2003).

Leishman and Watkins (2004) added to the behavioural agenda by examining the decisions made by office occupiers. To date, studies on office occupiers' choices have taken the form of location choice models. These studies (Ball *et al.*, 1998; Evans,1985; Goddard, 1975; Dunse *et al.*, 1998, Bollinger *et al.*, 1998; Mills, 1992) however have stripped out the complexity of the decision making process on office location decisions and consequently ignored the importance of factors other than rent and location in shaping decision. In mainstream neo-classical economic analyses, urban office markets are depicted as

coherent, unitary entities. Individual firms are assumed to be rational profit maximisers whose selection of office property will be dominated by a trade-off between accessibility and space. In reality, however, the process by which firms match themselves to office units is much more complex than simple location choice decisions. For example, some observers have noted the tendency toward decentralisation which has resulted from the growing importance of IT requirements and flexible working practices (Ball *et al.*, 1998). This implies that the influence of rent and location may now be dampened by additional concerns. An earlier study by Alexander, 1979 highlighted the tendency of consumers to engage in satisficing behaviour and to enter into sub-optimal location decision.

Simon (1993) introduced the strategy of satisficing to describe a realistic version of rational decision making. Decisions are rational if they are appropriate to the accomplishment of specific objectives. Decision makers seek to satisfice because they do not have the knowledge, ability or capacity to maximise. An organisation's decision is rational if it is consistent with its goals, objectives and information.

The neoclassical condition of perfect human rationality viewed constraints in the external environment; while Simon's concept of bounded rationality views constraints arising from the cognitive limitations of individuals themselves (de Bruin & Flint-Harttle, 2003). In particular, individuals lack the capacity to take account of all the available information, compile exhaustive lists of alternative courses of action, and ascertain the value and probability of each of the possible outcomes (Hindess, 1988). Recognition of such cognitive constraints led Simon to substitute the orthodox notion of maximising behaviour with that of satisficing behaviour (Simon, 1957). By satisficing, Simon was referring to behaviour that would generate satisfactory outcomes, not necessarily conforming to the

maximum of the perfect rationality model but nevertheless outcomes beyond the minimum.

In strengthening the argument for satisficing behaviour, a study on property investment behaviour in New Zealand has observed that the individual investors in residential rental real estate make decisions based on imperfect knowledge, limited domain-specific information and cognitive powers of calculation. They are, therefore, not always able to achieve optimality within the context of a dynamic and complex property investment market. Optimisation did not feature as the primary decision making criteria for the investors in the study. Investors were influenced by determinants such as preference and feelings of comfort with a tried and true investment product (de Bruin & Flint-Hartle, 2003). Similar behaviour has been observed by Ross (2003) of the model in neoclassical economic research, by which it is assumed that organisations use perfect market rationality when establishing their business operations. Apparently the central business district (CBD) office market is neither rational nor perfectly competitive. Similarly, decisions leading to sub-optimal behaviour must occur in a market where the vast array of information and the need to maximise is absent (North, 1990). Other theoretical and empirical works have dealt with different types of firms on the maximising behavioural issues (Edward, 1983; van Dijk & Pellenbarg, 2000).

3.3 CONSUMER BEHAVIOUR AND DECISION MAKING CONCEPTS

3.3.1 Office Space as a Product

A product has been defined by Armstrong and Kotler (2005) as anything that can be offered to a market for attention, acquisition, use or consumption, and that might satisfy a

want or need. Broadly defined, products include physical objects, services, events, persons, places, organisations, ideas or mixes of these entities. Product is also been said to be the key element in the market offering

To consider real estate or any aspect of it as a product and not just an input requires addressing the interrelated attributes of products that impact upon their users. From the corporate real estate perspective, in identifying the distinct areas that relate to corporate real estate operating decisions, Nourse and Roulac (1993) argued that if buildings are products then building design is an integral aspect of real estate strategy, not a derivative.

Thus, by considering office space as the product in the market offering to the tenant market, it would be useful to consider the aspect of the consumer decision making process. The consumers chosen in this study are tenants seeking to occupy office space in the purpose built office buildings in Kuala Lumpur city centre.

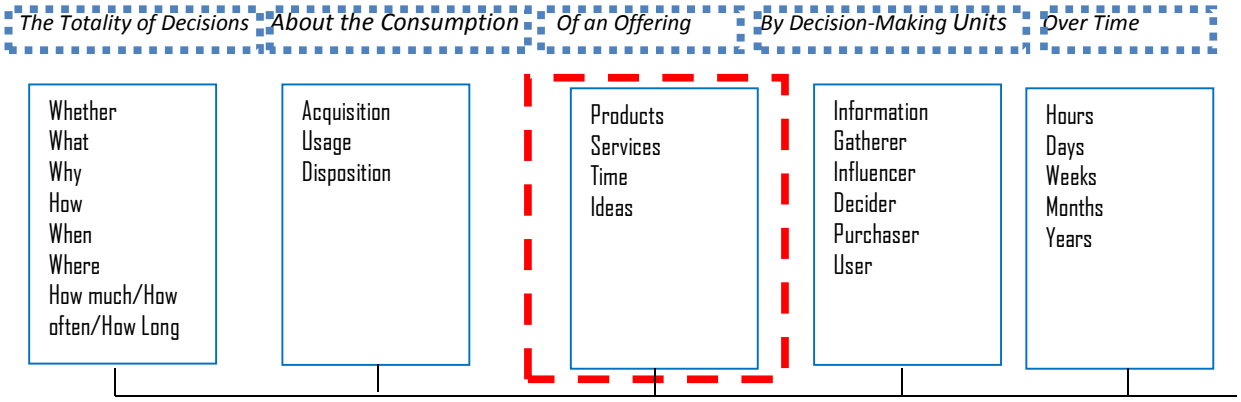
3.3.2 Consumer Decision Making

The literature on consumer decision making provides perspectives of the decision making on the product on offer. When evaluating potential alternatives, consumers tend to use two types of information 1) a list of models from which they plan to make their selection (from the consideration set) and 2) the criteria they will use to evaluate each model. The criteria consumers use to evaluate the alternatives products that are within the consideration set are usually expressed in terms of important product attributes. Consumer decision rules, often referred to heuristic decision strategies and information processing strategies, are

procedures used by consumers to facilitate consumption choices (Schiffman & Kanuk, 2007).

Traditionally, consumer behaviour has been thought of as the study of 'why people buy'. The activities people undertake when obtaining, consuming and disposing of products and services have been defined as consumer behaviour; the activities within the scope of consumer behaviour are: obtaining, consuming and disposing. Some of the activities under the scope of obtaining entail activities leading up to and including the purchase or receipt of a product. These would include searching for information regarding the product features and choices, evaluating alternative products or brands, and purchasing; consuming refers to how, where, when and under what circumstances consumers use products; disposing includes how customers get rid of products and packaging (Blackwell & Miniard, 2001). Consumer behaviour has been defined by Hoyer and MacInnis, 2010 as to reflect the totality of consumers' decisions with respect to the acquisition, consumption and disposition of goods, services, activities, experiences, people and ideas by (human) decision-making units (over time). This can be depicted as in Figure 3.1, which shows some important elements with regard to the definition.

Figure 3.1: Elements of Consumer Behaviour



Source: (Hoyer & MacInnis, 2010).

A four domain model was also developed by Hoyer and MacInnis (2010) which classified the main factors that affect the acquisition, usage and disposition decisions of a product. Figure 3.2 shows the four (4) domains that consist of the psychological core, the process of decision making, the consumer's culture and consumer behaviour outcome. Each domain is related to the other.

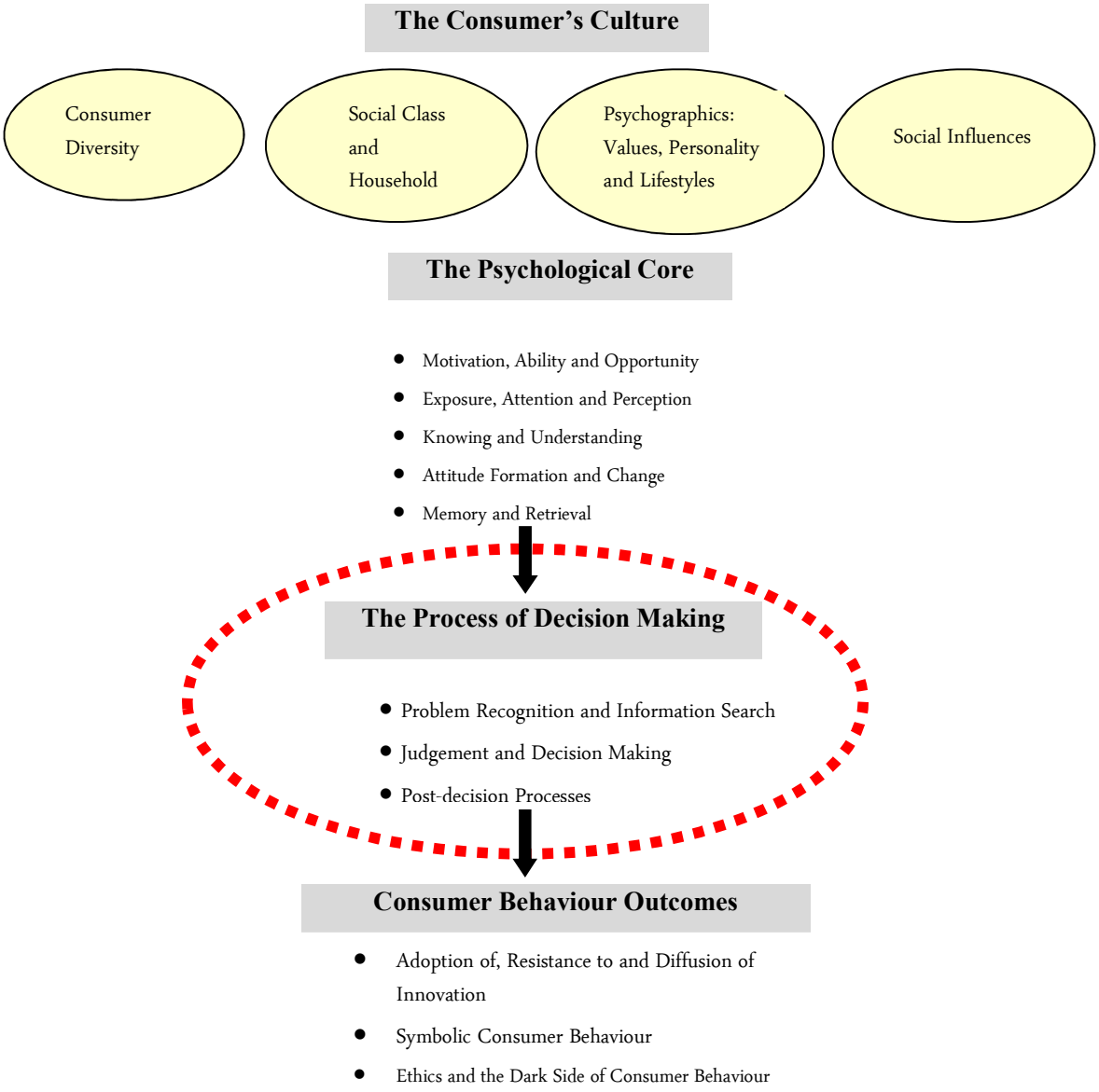


Figure 3.2: A Model of Consumer Behaviour
Source: (Hoyer & MacInnis, 2010)

Purchase decisions by businesses and organisations are often described as 'rational' or 'economic'. Within the organisations, unique rules and cultures that influence the behaviour of their members have been developed (Hawkins *et al.*, 2004). Thus, it is important to understand the characteristics of organisations that relate to their purchasing decision making behaviour. Understanding organisational purchasing requires many of the

same concepts used to understand individual consumer or household needs. Like individuals, organisations face new complex purchase decisions that require careful problem definition, extensive information search, a long and often technical evaluation process, and a long period of use and post-purchase evaluation. When comparing organisational buying decisions to family purchases, organisations have relatively objective and clearly articulated criteria such as profit maximisation that guide purchases. By relating this concept to the office space occupation decision making process, tenants face similar situations when they are making office leasing decisions. After the recognition of the problem and the need to lease an office space, tenants may engage in an extensive search for useful information on which to base a choice. Gathering information, for example, by visits to the potential space, and investigating the specifications is part of the formal information search. Informal search can occur during discussions with the marketing agents or property owner/manager. As previously noted, when evaluating potential alternatives, consumers tend to use two types of information: (1) a list of models (brands) from which to make their selection (the consideration set) and (2) the criteria they will use to evaluate each brand (or model) (Schiffman & Kanuk, 2007). The criteria consumers use to evaluate the alternative products that constitute the consideration set are expressed in terms of important product attributes.

Consumer decision rules (often referred to heuristics), decision strategies and information processing strategies, are procedures used by consumers to facilitate consumption choices. Consumer decision rules have been broadly classified into two major categories: compensatory and non compensatory decision rules (Schiffman & Kanuk, 2007). In the compensatory decision rule, a consumer evaluates the options in terms of each relevant

attribute and computes a weighted or summated score for each option. The computed score reflects the option's relative merits as a potential purchase choice. The assumption is that the consumer will select the brand that scores highest among the alternatives evaluated. On the other hand, non compensatory decision rules do not allow consumers to balance a positive evaluation of one of an option's attributes against a negative evaluation of one of the option's other attributes. Three non compensatory rules which can be considered are: the conjunctive rule, the disjunctive rule and the lexicographic rule (Schiffman & Kanuk, 2007). Though these rules permit the consumer to choose the product based on the simple orderly manner of evaluation, the task of making the best choice can be daunting when there are many attributes to consider. Thus, multi-criteria decision making techniques have been developed to assist the decision making process. The problem of selecting a suitable office space (choice problem) and prioritising criteria (ranking problem) can be adopted here.

3.3.3 Consumer Decision Making Models

As marketers manipulate the principles of marketing, there have been questions on how consumers make decisions. Examining the main decision making models by Richarme (2001), several aspects of these models can be adopted. He mentioned one of the earliest theories, known as the Utility Theory, by von Nuemann and Morgenstern (1947), which proposed that consumers make decisions based on the expected outcomes of these decisions. In this model, consumers were viewed as rational actors who were able to estimate the probabilistic outcomes of uncertain decisions and select the outcome which maximised their well being. Under this theory, should consumers want to search for a new apartment, they would evaluate every apartment in the market and form a linear equation

based on pertinent variables and then select the apartment that had the highest utility score. However, consumers are typically not completely rational or consistent or aware of the various elements in their decision making. In addition, although consumers are good at estimating relative frequencies of events, they typically have difficulty translating these frequencies into probabilities. Thus, this model, even though it had been viewed as the dominant decision making paradigm, had serious shortcomings (Richarme, 2001).

Another concept mentioned earlier (see Sec 3.2) is a concept brought about by Herbert Simon known as Satisficing. It places the consumers where to go, stopping the decision making process when they are satisfied. In the case of the search for a new apartment, consumers might just evaluate apartments within a certain distance to their desired location, and stop when they found one that was 'good enough'. This theory still left significant room for improvement in the area of prediction. He further extended this area in the investigation of the field of 'bounded rationality', which views decision making as a fully rational process of finding an optimal choice given the information available. Bounded rationality is the notion that in decision making, individuals' rationality is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make decisions (Simon, 2000).

Another way to look at bounded rationality is that, because decision-makers lack the ability and resources to arrive at the optimal solution, they instead apply their rationality only after having greatly simplified the choices available (Simon, 1979). Thus, the decision-maker is a satisficer, one seeking a satisfactory solution rather than the optimal one. It was also suggested by Simon (2000) that economic agents employ the use of

heuristics to make decisions, rather than a strict rigid rule of optimization, due to the complexity of the situation, and their inability to process and compute the expected utility of every alternative action. Simon (2000) further argued that the theory of bounded rationality then will be much concerned with procedural rationality, the quality of the processes of decision, as with substantive rationality, the quality of outcome. Kahneman (2003) proposes bounded rationality as a model to overcome some of the limitations of the rational-agent models in economic literature. It was also argued that human agents are subject to bounded rationality, which implies a limit in rationality, in contrast to the traditional assumption of economics of the perfectly rational being, in that people act rationally but are limited by their analytical and data processing capabilities (Williamson, 1985).

In a study in the UK by Greenhalgh (2008), it was noted that small firms in their relocation decisions lack adequate resources to assess all the variables likely to impact on the decision and are therefore prone to making decisions based on bounded or constrained information. Decisions are made in different ways depending on the type of organisation, its size, corporate structure and culture (Greenhalgh, 2008). A recent study by Elgar and Miller in 2009 on firms' relocation decisions has made observations of earlier studies (Edwards, 1983; van Dijk & Pallenberg, 2000) on firms' location, that assumptions of maximising behaviour by the firms and having full knowledge of the market are partially true when applied to firms' location issues. Maximising behaviour probably makes sense for some type of firms (in particular large manufacturing firms). However, it is unlikely for other types of firms (especially small office firms) because of the limitation imposed by their size and office 'production' method (Edwards, 1983, Elgar & Miller, 2009). Firms as

agents have limited information, are boundedly rational, and settle for sub-optimal outcomes rather than maximum profits (Simon, 1959; Cyert & March 1963; Pred, 1967). Apart from the decision making process, there are four (4) key elements in behavioural location theory, which are: the rule of limited information, the ability to use information, perception and mental map and uncertainty (Pallenbarg *et al.*, 2002)

For the purpose of this study, the model developed by Simon (2000) shall be adopted, which takes a perspective that the decision maker in the office market in Kuala Lumpur city centre is comprised of different profiles and characteristics and is bounded by rationality in making decisions. However, the decision making process of searching for an office space in an office building involves multi-criteria aspects in achieving the ultimate objective (choice).

3.4 MEASURING CONSUMER PREFERENCE

Real estates are designed and constructed for the occupiers; and therefore, the whole sector, i.e., property investors, developers, and service providers, requires methods enabling them to understand the occupiers' needs and preferences. Since the market is changing from a traditional supplier-driven business towards a demand-driven business, such methods to evaluate the occupiers' needs and preferences become crucial. Identifying the key determinants in the various phases of the customer relationship/lifecycle ensures the competitiveness of the occupiers as well as the real estate sector (Markland, 1998).

Dent and White (1998) recognised in their study the importance of research around occupier needs within the effect of changing working practices from not only the users' perspective but also from the organisation's operational perspective. It has been suggested by Haynes (2007) that the scale of evaluating office space should be broadened from the traditional physical elements (as in the studies by methods as real estate norm (REN) analysis tool (Stichting REN, 1992 adapted from Voordt *et. al*., 2005), post occupancy evaluation (POE) (Baird, 2001; Voordt & Wegen, 2005), building quality assessment methods (Voordt & Wegen, 2005; McDougall *et al.*, 2002) and serviceability tools and methods (Davis & Szigetti, 1996 adapted from Voordt & Wegen, 2005) to virtual and social elements of the offices creating the entity of new ways of working. The diversity of organisations occupying office space leads to organisations giving more value to different real estate attributes. The effects of the working environment on performance and productivity, both in terms of quality and quantity, have been widely studied (Haynes, 2007), underscoring the importance of providing office environments that meet the occupiers' needs and preferences. To capture the preferences regarding the different elements of offices, applicable methods enabling the analysis are required. A further study by Niemi and Lindholm (2010) in Finland tried to gauge this perspective. The study was based on a series of theme interviews combined with a literature and article review. The aim of the interviews was to identify and analyse the methods applied to capture the occupiers' needs and preferences. Based on the interviews, it was clear that most of the interviewed companies lacked proper tools for identifying and evaluating the office occupiers' needs and preferences. The highest score was received by the future working environment barometer, which is an annual web-based questionnaire survey focusing on

the future, evaluating current offices, as well as the occupiers' future needs and preferences regarding attributes such as office location and workspace.

The above study concentrated on methods applied by the interviewed organisations, but it was highlighted that the focus could be further widened by studying methods applied in other business areas for understanding various needs and preferences as well as developing profiles of occupiers with similar needs and preferences. It was suggested that new applicable methods for the real estate sector could be developed from consumer research and profiling occupiers based on their service preferences where different parts of the elements should be combined in order to get a comprehensive analysis of the preferences within one profile. Leishman and Watkins (2004) argued that even a simplistic classification based on the occupiers' decisions regarding location and space needs provides the ability to predict the future needs of certain occupier groups.

In considering the suggestion of the development of a new method to assess the preference of office occupiers, this study attempts to undertake the development of a tool to assess office tenants' preference from the consumer research perspective. The preferences of different profiles of tenants have been considered to gauge the differences between them.

Thus, with the identification of the need for an evaluation method for office occupiers' preference, this study has embarked to seek for one suitable for the Kuala Lumpur city centre context and the scope mentioned above. Several methods are known in science and in practice to survey customers' preferences, whereas most practical and theoretical applications in marketing use conjoint analysis.

However, recent studies (Koo & Koo, 2010; Helm *et al.*, 2008) into customer preferences have suggested another applicable method known as Analytic Hierarchy Process (AHP). This is a common method in decision analysis, with a wide range of applications (Saaty, 1980; 1994; Schmoldt *et al.*, 2001; Zahedi, 1986; Vargas, 1990; Golden *et. al*., 1989) but rarely used in marketing. A detailed explanation of these methods and other multi-criteria decision-making methods can be found in Chapter 4.

3.5 AN OVERVIEW OF OFFICE OCCUPATION STUDIES

This section presents an overview of the various areas of studies on office occupation. For example, the previous literatures on office occupation decision making has emerged from the urban and real estate economics aspects (Leishman *et al.*, 2003), corporate real estate and operational property requirements decisions (Gibson & Lizieri, 1998; Nourse & Roulac,1993; Bottom *et al.*, 1996), as well as relocation and retention decisions (Dogge, 2004; Sullivan, 2006; Dean & Lee, 2000, Babcock, 2003).

Office demand and office space management issues have attracted a considerable amount of research since the mid 1980s. Survey work has attempted to identify the key criteria used by occupiers to select business space, to examine the determinants of the decision to relocate and, more recently, to assess current and future space requirements. According to Dent & White (1998), significant influencers for future office investment include the dynamic but opposing forces of agglomeration and decentralisation. Other published surveys (Connaught Report, 1997; Howland & Lindsay, 1997; Wadsworth, 1996) examined the ability of existing office provision to meet the needs of the changing market. Howland and Lindsay's work tracked the origins of occupiers in new buildings and the

destination of those from older buildings. Wadsworth's research suggested that selection of office space is based more on utility than design or prestige. Finally, the Connaught Report commissioned by the Royal Institution of Chartered Surveyors which focused on the holistic view of refurbishment within the second-hand office market concluded that half of the market will not meet modern specifications/tenant requirements by the end of 1998. Dent and White (1998), who then carried out another study to have a better understanding of occupier needs, discovered that location was identified as a very important factor in business activity by seventy five (75) per cent of respondents. From the responses, overall rental level was considered the most important in coming to a decision. This was followed by length of lease, break clauses in leases, and level of service charges. There was a clear distinction between the larger firms and those occupying less space. From the corporate real estate perspective, the work of Gibson and Lizieri (1998) investigated the management of corporate real estate, both at a strategic level and in relation to day-to-day decisions. Three aspects of business transformation were reviewed: changing organisational structures, the introduction of new working practices and the implementation of new office technology. In another study by Thrall (2002), the components of decision making for real estate evaluation was represented by the five most important elements: location, timing, product, price, and contract terms.

The importance of research around occupiers' real estate needs and requirements has been brought up by several researchers in the the past decade (Dent & White, 1998; Lizieri, 2003; Leishman & Watkins, 2006). Studies around occupiers' requirements and choices have often focused on the location or physical characteristics of the real estate (Leishman & Watkins, 2002; Leishman *et al.* 2003). It is apparent that the study by Leishman *et al*.

(2003) has added to the behavioural agenda through the examination of the decisions made by office occupiers. It has been highlighted that the earlier studies of office occupiers took the form of location choice models. Empirical research has confirmed that the desire of office occupiers to locate in the core of the city has tended to push up rents in the central business districts, giving rise to the negatively slope bid-rent curve (Dunse *et al.,* 1998, Bollinger *et al.*, 1998, Mills, 1992). These studies however have stripped out the complexity of the decision making process and consequently ignored the importance of factors other than rent and location in shaping decisions. The neo-classical theory defines the 'optimal' behaviour of the firm in economic terms; under the assumptions of rationality and perfect information it may be considered particularly useful to analyse the relocation behaviour of small firms.

Pallenberg & Wissen (2002) put forward a notion that the idea of optimal decision and minimising and maximising is a theoretical abstraction; and replaced this picture of the firm with one of the firm as the learning, estimating, searching, information-processing organism. The decision maker is more a satisficer than an optimiser. Bounded rationality does not imply irrational behaviour but recognises limitations to the ability of the decision maker in evaluating information. In general, according to behaviour theory, firms consider only a limited of choices. Alternative are searched for and evaluated in a strongly sequential way.

Nowadays, most firms are more complex organisations, consisting of many individuals and groups who may influence decisions, such as managers, shareholders or workers' representatives (Wood *et al*., 1990). According to behavioural theory, firm size is one of the key factors influencing firms' relocation, because moving costs and the organisational

problems associated with relocation are considerable for large firms (Van Djik & Pellenbarg, 2000). The relocation factors can be linked to the neoclassical, behavioural and institutional theories (Brouwer *et al.*, 2004).

Most studies looking at office tenants' choices have focused on location preferences, and do not include the building (Leishman & Watkins, 2004). However, Pen (2002), quoted by Appel-Meulenbroek (2008) has looked into the movement decision making processes of companies more intensively and identified an extensive list of push and pull factors both on the location, building and organisational levels.

A similar observation was made by Louw (1998) in an earlier study pertaining how factors relating to accommodation has been overlooked. It was found that it has a major role in the decision making process in particular for firms that want to rent office space. It is said that firms that rent office space are dependent upon the supply offered in the real estate market and what it offers. Thus, the core of the accommodation issue lies in bridging the gap between the static nature of buildings and the dynamic development of organisations that have responded to technical developments and quickly changing markets. The type and size of premises will affect the firm's productivity. Louw revealed that accommodation should not be overlooked as the type and size of the premises will affect the company's productivity. It is found that accommodation is a key role in the decision process in particular for companies that want to rent office space. This observation has implications for location theory, which generally assumes that companies will build their own premises. However, firms that want to rent are dependent upon supplies offered on the real estate market. Louw identified criteria used in the search and decision process as falling under three (3) headings: 1) location factor 2) accommodation - functional factors, technical

factors: 3) financial and contractual factors. He discovered renters mentioned significantly more of the financial factors than did the buildings' owners, suggesting that location plays a bigger role among the owners' search and decision process than for renters.

While studies have been made to highlight the changing structure of organisations from the traditional modes of operations to more highly flexible and diverse systems, Higgins (2000) identified three major themes: the role and impact of information and communication technology; changes to the organisation of production and distribution; and structuring of business and new work place practices (Lizieri *et al.*, 1997, Guy & Harris, 1997). Higgins (2000) provided an overview of the main macro and micro factors that influenced the organisations' decision making process for the new space. It was highlighted that organisations place more importance on current micro issues than on current macro issues in their new space decision process. The microeconomics factors were building locality, business profile, cost implication, lease arrangements and occupiable space.

Having considered the general office occupation studies, it would also be useful to include studies that have been conducted on tenants' satisfaction/retention. It has been said that a satisfied tenant is much more committed, and tends to be loyal and not move (Dogge, 2002). Babcock (2003) discussed the BOMA International survey results on tenant satisfaction and tenant retention. The paper discusses the factors of consideration for tenants' retention, which include adding up amenities, whereby tenants look for a physical place in synchronisation with its current status. Location was ranked as the most crucial consideration in tenant attraction and retention whilst technology was the most significant factor. Center of Built Environment, University of California (1999) conducted a study on

what office tenants want and how much they are willing to pay. The traditional areas of real estate decision making were described, highlighting the major factors under consideration. Sullivan (2006) highlights the results of a survey conducted among landlords and tenants (involving 6,642 readers of Building Operations Management) as to the level of satisfaction derived from leased space. The survey shows that a majority (over two-thirds) of tenants are consistently satisfied with their landlord with regard to responsiveness to requests and complaints.

RICS Tenant Satisfaction Index (2005) revealed that various components of performance used need not include location but could include standard of premises and value for money, landlord and agent communication and contract detail (ease of contract alteration and problem resolution, lease flexibility). Historically, tenants' main concerns have been location, standard and rent.

The importance of location in a workplace was ranked high by building owners in the BOMA survey, as well as by a panel of experts, as one of the most crucial considerations in tenant attraction and retention (Babcock, 2003). Technology is also increasingly a driving factor for tenant retention. Location, to some extent, drives business and where a business wants to be. Due to the spate of recent tragedies that have happened in recent years, tenant satisfaction is often linked to a building's security, and facilities' managers have been updating their buildings' systems and emergency response plans (Babcock, 2003).

In a study to develop a multi-criteria model for corporate property evaluation, Hoffman *et al.*, 1990 suggested that attributes associated with a property include site features such as:

size, price per square foot, total cost, physical layout, renovation requirements, lease-buy options, accessibility, visibility, proximity to major traffic generators, traffic volume, options for expansion to adjoining buildings or vacant lots, prestige of location, neighbourhood characteristics, projected customer base in trade area, market growth in trade area, untapped demand in trade area, the prices that existing facilities in the subject locale command, and number and strength of competitors in trade area, the crime rate in immediate area surrounding the property, and parking space. Many of these variables have been identified in the corporate evaluation literature (Applebaum, 1966; Hammer, 1974; Leinberger, 1985; Leonhardt, 1984; Mecurion, 1984; Segal, 1987; Tiersten, 1988). The model which was intended to evaluate property from fitting the organisation with its changing environment, however, examined the perspective of a number of cities within the constraints of the goals of the selected organisations. The model did not specifically tailor it to fit an office evaluation and therefore the criteria selected may not be suitable.

An observation by Abel (1994) of a study by Capital & Counties, one of the top ten property companies in the UK showed that, while cost is an important factor, the five key criteria in the choice of premises were: 1) proximity to major road networks; 2) a modern prestigious building; 3) good car parking; 4) flexible space at the right price; 5) a comfortable and secure working environment. Other factors influencing a relocation decision included the desire for amenities, and physical attributes of the buildings as well as environmental issues. Another study by Dent and White (1998) has identified significant influencers for future office investment in which location was a very important factor in business activity. When asked about particular specification features, respondents in the study cited private car parking, proximity to public transport and building security as very

important. Overall, rental level was considered the most important in coming to a decision. This was followed by length of lease, break clauses in leases and level of service charges.

In examining the work that has been carried out in Malaysia, a research report entitled "Why rent in Kuala Lumpur" by the National Institute of Valuation (INSPEN), Malaysia in 1993 identified the key selection criteria for office space occupation in Kuala Lumpur. Key factors used as guidelines for classification of office buildings were location, building design, building services, rental rates and building image. The study, however, did not specifically rank the importance of the factors accordingly or gauge the level of tenant satisfaction in terms of expectation and performance towards the factors identified. It is interesting to note that previous studies have identified various factors to solicit tenants' requirements and it would useful to find out whether these factors are still relevant in the current market office and business scenario in Kuala Lumpur.

As the current study aims to develop a framework for tenant organisations for office space occupation at Kuala Lumpur city centre and to have the office space treated as a product, it would be useful to adopt the microeconomics factors identified by Higgins *et al.* (2000). The main themes are categorized into five (5) categories: (1) Office space - space flexibility, employee working environment, standard of building finishes and services; (2) cost implications - total occupancy costs, unit cost of space, fit out costs; (3) building locality - pedestrian accessibility, public transport, vehicle access/parking, surrounding amenities; (4) business profile - image, vicinity to clients, locality associated with business category; (5) lease arrangements - previous lease expiry, new lease length, rent review structure, flexible lease terms.

3.6 LITERATURE MAPPING: A WAY TO IDENTIFY RESEARCH GAPS

The research gaps of this study are identified through the literature mapping of previous studies related to office occupation. As mentioned by Creswell (2008), literature mapping is adopted to establish the themes and patterns found in the literature. A rigorous review of past literature was conducted to identify the different patterns or themes encompassing areas of office occupation; the main research is summarised in Table 3.1.

This mapping process provides the identification of gaps in the areas of office occupation. The outcome of the mapping enables the study on the factors that influence office occupation to be formalised according to the classification as discussed in the subsequent sub-sections. Notwithstanding the brief overview of the identification of research gaps, the summary on the findings and information from the literature review provides exertion to the initial part of the study. It is presented in Table 3.1 in terms of major studies that have been conducted on office occupation.

Table 3.1: A Summary of the Main Studies in Office Occupation Decision Making

Author	Elgar and Miller (2009)	Appel-Muelenbroek (2008)	Beltina & Labeckis (2006)	Sing *et.al*. (2004)	Leishman *et al.* (2003)	Leishman and Watkins (2002)	Higgins *et.al*. (2000)	Pittman and McIntosh (1992)
Objectives of Study	Focused on the results of SOLD (Survey of Office Decisions), an Internet-based retrospective survey designed to gather data regarding location decisions of office firms in Greater Toronto Area, Canada Also, examination of the behavioural perspective of office occupiers – maximers or satisficers	Addition to the behavioural property literature and improvement of landlord-tenant relationship through exploring the effect of office (location and building) "keep", push and pull factors on satisfaction and loyalty of tenants in the Netherlands	Determination of company choice of high rise offices in Riga, Latvia	Evaluation of the office space preferences of occupiers in Suntec City, Singapore	Examination of the changes in urban office occupiers' space requirements and their impact on the structure of urban office markets in cities in Scotland. Specific objectives: 1. Collect info on occupiers' space and locational requirements by submarkets 2. Compare occupiers' trade off and preferences between submarkets in the Edinburgh markets 3. Examine the extent agents influence the process in which occupiers are matched to space in particular submarkets.	Examination of the decision made by office occupiers using the behavioural agenda in Scotland. Assessed the relative importance of range of factors, including the characteristics of firms in determining the choice of office space to be occupied.	Identification and evaluation of factors influencing organisations' new space decisions in Sydney CBD prime commercial markets.	Re-examination of the factors that are important to tenants in deciding where to locate in cities in USA
Types of Investigation	Descriptive	Exploratory	Descriptive	Descriptive Study	Descriptive	Descriptive	Descriptive	Descriptive

Type of Information Collection	Quantitative	Quantitative and Qualitative	Quantitative & Qualitative	Quantitative	Quantitative	Quantitative and Qualitative	Quantitative	Quantitative
Methods of Data Collection	Survey	Face to face Interview	Questionnaire Survey	Questionnaire Survey	Questionnaire Survey	Questionnaire Survey	Questionnaire Survey	Questionnaire Survey
Method of Data Analysis	Descriptive	Descriptive	Descriptive Statistics, PCA, Cluster Analysis,	Descriptive Statistics, PCA, Cluster Analysis, Multinominal Logistic Regression (discrete choice)		Descriptive Statistics, Logistic Regression Methods	Descriptive, Important Index	Descriptive Statistics,
Unit of Analysis	Office Organisations	Tenant Organisation	Organisation	Organisations	Organisations	Organisations	Organisations	Organisations
Target Respondents	Small and Medium Firms	Tenants of 2 multi tenanted building	Companies who rent or might want to rent high rise office space	Occupiers in office buildings	Occupiers in office buildings and estate agents	Office occupiers in Edinburgh	Commercial Occupiers from Industrial, Retail and Office	Tenants of 2 multi tenanted building
No of Distributed Questionnaire	2300		296	342	Randomly selected addresses from SPN database of office property addresses	119 (occupiers coded as professional services, financial services, recruitment and training, business services, office linked to manufacturing or construction firms and others		250
Response Rate	10% (222 usable responses)	66% (38)	33% (99)	17.8% (61)	61	119		25% (63)
Number Interviewed	-	38 out of 58	Experts to benchmark	-	Agents – 24 structured	-		-
Sampling	Purposive		Non Probability,	Purposive	Random Quota	Random		Random

Procedure			judgmental		Sampling – structure interview			
Main Findings	• Most offices relocate to similar location to previous location • No direct link between reasons that make office firms decide to move and the attributes that attract the firm to a specific location • Agglomeration and proximity to supplier have marginal role in small and medium size office firm location decisions • In both push and pull stages of location decisions, attributes of the location are more important than the area and its	• Important push/pull factors – building factors • Important keep factors – building and surrounding	• 3 distinct clusters of tenants – Money Saver (25%), Developing Enthusiasts (35%), Established Value Appraisers (40%). • Important factors for choosing A & B buildings: good location, parking availability, rent, office infrastructure • Identified attractive factors for businesses	2 most important factors – • Image and prestige of office location, accessibility of public transport • Premium rental being paid to be close to competitors, suppliers, and clients. The pro-business environment factor appeals to firms that have already established a strong business network in the building. • 5 categories of business identified ie 1.Finance, Insurance, banking 2. IT, media, telecom, dot-com business 3. Professional Services 4. Trading,	• Agents' knowledge of occupier preferences vary across submarkets and that in particular are less informed about occupiers' preferences in non-traditional submarkets. • Significant difference s in preferences between submarkets • Firms in non central location are less location sensitive and value few locational attributes as highly as city centre firms • Agents' perceptions tend to reflect	• Model developed to identify firms' choice of property type from its size and business profile – can be used as a marketing device for agents to match office users to available space • The firms' choice of property type will be contingent on their size, type of business and geographical extent of their market. • Developed Discrete Office Space Choice	•	• There is a variation of the selected important factors between small and big firms • Least important factor – general ambience of the area, closeness to major transportation arteries, proximity to customers, and closeness to the residences of key personnel. • Most important factor – rental rate, accessibility of parking, escalation clause in the least • Importance of proximity to suppliers increased with firm size • Important to small firms-building identity and location relative to major transportation

	accessibility • Office firms are satisficers in their location behaviour – stop their search once eventual location detected • SOLD results indicate that accessibility factors are substantially less important for the location dcision than space and physical condition considerations			wholesale, retail and delivery services 5. Other (consultancy, oil, pharmaceutical)	accurately the preferences of occupiers though they tend to overvalue attributes such as structural, locational and accessibility	Model		arteries • Important to big firms – proximity to suppliers, convenience to airport
Comments/ Gaps Identified	The study uncovered the behavioural nature of the small and medium office firms in Canada. The study is limited to location decision studies and does not involve other aspects of influence for office occupation	The study covered only tenants in 2 office buildings in the same locality with relatively new and small tenants. Thus the findings could be influenced by such limitation	The study covered a small sample of office stock as Riga is still developing and has a small number of tenants	The study covered only on a sample of firms in a development in Singapore. It did not attempt to gather the important factors but to identify the influence of different occupiers' characteristics in office space decisions.	The study revealed the behavioural perspective of decision making and only covered the few cities in Scotland.	Central Hypothesis: firms are not identical and that the characteristics of occupiers are of value in predicting their location/space consumption decisions.	The study revealed the macro as well as microeconomics factors relating to new office space demand. The findings however are not limited to sole office occupiers but also to industrial as well as retail sectors	The study was conducted in a city that surveyed only two office buildings. The conclusion may be outdated considering the current demand of office occupiers have changed with the rapid advancement of ICT.

The summary provides an overview of the previous office occupation studies which have been conducted in different countries which include the USA, Australia, the UK, the Netherlands, Singapore, Latvia and Canada. Most of the studies attempted to show the important factors influencing office space occupation decisions. Pittman & McIntosh (1992) concentrated on the locational requirements of firms in USA whilst the work by Leishman and Watkins (2004) showed the preferences of the various profiles of occupiers in Scotland, UK and developed the discrete office choice model, a model which used logit regression method. A further study by Leishman *et al.* (2003) discovered that there are differences in preferences across the various sub-markets in the cities of Scotland and occupiers in non central locations are less location sensitive. It also found that firms in sub-centres with inherently different urban and spatial characteristics would have significantly different preferences for their office space. The findings by Leishman *et al.* (2003) were different, with both neoclassical location theory and existing knowledge of corporate objectives for property (see Roulac *et al.*, 2000).

In Australia, the work of Higgins (2000) attempted to seek the performance of commercial properties with regard to the factors affecting the demand for space. It was discovered that there are macro and micro factors influencing the decisions among the retail, industrial and office sectors. His work was useful as identification of the micro factors has narrowed down the scope of factors for the determinations of important factors among occupiers especially in the CBD area.

The study on office choice decisions has been extended to Singapore with the work of Sing (2004, 2006) who tried to empirically test the decisions of firms currently occupying

offices in Suntec City, Singapore. Factors related to location (image and accessibility), building factors as well as non-location and network connectivity were found to be significant determinants of influencing office space decisions of selected clusters of firms in a location. The work of Sing has also been extended to seek whether the heterogeneity of firms is an important assumption in the behavioural studies of office space decisions, as postulated in Leishman and Watkins (2004). Extended along the behavioural agenda, the study in Singapore examined the office space preference occupiers in Suntec City using a structured questionnaire survey. There were significant differences of space decisions among selected clusters of firms signifying the different choices among them.

Research by Beltina and Labeckis (2006) investigated the various aspects of office occupation in the areas of Riga, Latvia, where it drew from the following sources: i) survey data and ii) expert opinions in the field to indicate the most important factors for choosing class A and B + office space. Drawn from the behavioural theory of reasoned action, the study identified three types of occupiers, whose important selection factors included rent and the building as well as amenities. The study in the Netherlands (Appel-Meulenbroek, 2008) on the other hand revealed the factors from a customer relations management (CRM) perspective; this research describes exploratory research into 'keep' factors and their effect on tenant satisfaction and loyalty to the current landlord. It seeks to add to the growing body of behavioural property literature by researching relevant aspects of the decision making of tenants. Also discussed is whether the results confirm existing theories on location decision making and customer satisfaction.

By adopting the above categories of issues to be examined in the context of the demand for new commercial space, an examination of the various mentioned elements would assist to focus on the factors to be chosen towards the development of the TOS. This examination could be made by examining the previous studies related to the main issues covering areas of (1) location – locality & profile (2) building features – physical nature of provision (3) financial/cost implications – financial aspects pertaining to occupation and (4) lease arrangements – the arrangement of the contractual terms for occupation.

3.7 FACTORS INFLUENCING OFFICE OCCUPATION FROM THE LITERATURE

Below is the identification of the factors under the broad classification identified which has been adopted by Higgins (2000) as in Section 3.6. A summary of the literature for each of the categories will be made.

3.7.1 Location

A study of office occupation in Singapore by Sing (2006) has elaborated on the previous work on the locational aspects in the decision making by office occupiers. Demand is highest for CBD locations because they offer better access to services and to labour, improved communication technology and infrastructure, and better client and market information (Daniel, 1991).

Office location (demand) theory emphasises agglomeration economies, particularly the opportunity for face-to-face contact as the driving force behind spatial concentration of firms in the CBD. In addition, the CBD provides access to staff, clients and a common

pool of services (Goddard, 1973). A common observation in office location studies is the occurrence of clustering of similar types of office users. There seem to be an emergence of a changing spatial pattern of functional specialisation and an office market structure which no longer exhibits clear evidence of declining rents from the city centre (Gibson & Lizieri, 1998; Ball *et al.*, 1998, Dunse & Jones, 2002). This is due to technological advances and changes in working practices such as 'telecommuting', 'hot desking', 'outsourcing' and 'delayering' are creating a shift in occupier demand.

Over the years, the literature drew to several benefits of agglomeration, including facilitating face-to-face meetings (Coffey & Shearmur, 2002), proximity to labour force and sharing of infrastructure (Stanback 1991; Coffey & Shearmur, 2002), and creation of an environment that is rich in information and allows for informal exchanges (Saxenian, 1994; Audretsch & Stephan, 1996). However, perhaps more than all the others, accessibility to complementary firms that provide inputs or use outputs of the firm is mentioned as the main reason for agglomeration (Coffey & Shearmur, 2002). Alexander (1979) had hypothesised that a different reason for agglomeration could be that professional office firms regard proximity to similar firms as beneficial even if they do not have any specific interactions with those firms. Hence, when an area is known as the preferred location for offices for firms of a certain profession, other firms regard that area as one that incorporates less risk than other possible locations. Economies of competition are mentioned in the literature as important considerations for firms (Maoh *et al*., 2005; March & Olsen, 1989). These considerations imply that firms will attempt to locate away from similar firms to decrease the competition for clients in the vicinity of the location. Office firms generally do not conduct utility maximising search behaviour as suggested by

economic location theory. Wyatt (1999) found that agglomeration economies of being close to workforce and complementary businesses were only deemed significant by financial and professional firms in their office locations decision. The sample firms are heterogeneous in various aspects, and their preferences for office space also vary depending on the firms' characteristics. Firms are heterogeneous and they place different priorities in their office space decisions.

However, when the centre grows to a critical size, its agglomeration benefits diminish as a result of growing costs of traffic congestion and increased office density. Firms are then more ready to trade off agglomeration economies (Clapp, 1980; Bollinger *et al*., 1998; Hui & Tse, 2004) for new office locations in fringe areas, which offer lower density office space with newer facilities at lower costs. Skilled labour is of great importance for the development of technical innovation and is attracted to localities with a high quality of life, which are more prevalent in large metropolitan areas (Malecki, 1979; Thwaites, 1982; Anderson & Johansson 1984; Johansson & Nijkamp, 1987). However, CBD locations still hold a great many advantages for certain types of operations. Winger (1997) suggests it is unlikely that there will be a withering away of cities over the coming decades.

The decentralisation process is further accelerated with the advancement of the information and communications technology (ICT), which breaks down the geographical barrier and reduces the significance of face-to-face contacts in the Central Business District (CBD) (Ball *et al.*, 1998). The advancement of ICT reduces the agglomeration economies of the CBD. As a result, there is an emergence of more efficient and lower cost sub-office market centres (Di Pasquale & Wheaton, 1996; Dunse *et al.*, 2001). Downward pressure on

demand for office space is also further aggravated when more ICT- enabled new working practices like corporate downsizing, delayering, outsourcing, and hot-desking are adopted by firms (Gibson & Lizieri, 2001; Sing, 2005, 2006). Bollinger *et al.* (1998), however, have different views on the impact of ICT on office space demand in the CBD. They argued that ICT use can reduce information costs, but they cannot fully replace the firms' need for face-to-face interaction.

Wyatt (1999), in his work on location planning, made several observations. He noted that the earlier work of Daniel (1975), Button (1976), Alexander (1979), Ihlanfeldt & Raper (1990) and Dent & White (1998) had suggested that accessibility to customers, suppliers, and other contacts is ranked above other considerations such as physical and ownership, characteristic and the business location decision. A good location for a property is accessible on the supply side (factors of production such as the work force, material, etc., and on the demand side (by customers), significance of supply and demand side factors dependent upon property type. Accessibility in terms of customer, client and complementary business activity is the key determinant of the location decision for many office activities, especially financial and professional services occupiers. These increase the demand for more accessible sites, which have traditionally been in the city centre. Wyatt's study revealed many occupiers, particularly large firms, accessing city central and out of town locations when making a location decision as a means of reducing the rent outgoings. Some business had separated those functions of face-to-face contact from those that do not. It is usually the medium size and larger firms that are able to separate business functions in this way, and this may partly explain why the geographical study found that

smaller businesses tend to be centrally located. Other reasons include proximity to complementary business, and customer client base (Wyatt, 1999).

Jakobsen & Onsager (2005) mentioned the preconditions for agglomeration in a study in Riga, Lativa, which include: 1) presence of specialised services (financial services, legal consultancy, management consultancy and other) in the central area; 2) advanced infrastructure and communications systems; 3) prestige related to location; and 4) face-to-face contact with other firms and institutions. They also emphasised the importance of proximity to clients and business partners and establishing informal contacts. Other studies have noted that experts from real estate agencies also suggested such perceptional factors as the attractiveness and visibility of surroundings, which was also suggested by Carn *et al*. (1988) or exposure of the office.

A further work by Brouwer *et al.* (2004) has made observation of the new notion of the neo-classical approach to location decisions. This study discovered that the mainstream economists have shown renewed interest on the 'neo-classical' approach and labelled it as 'New Economic Geography' (Krugman, 1995; Fujita *et al.*, 1999). It is based on explanatory models where location factors (e.g., transportation cost, labour cost, market size) are the main forces driving firm relocation. A firm moves from the current location to a new one when the first is no longer inside the spatial margins to profitability (push factors) and the second might be a profitable one (pull factor). Relocation costs are generally disregarded in the simple neo-classical framework because the emphasis is on full information and rational behaviour. The behavioural location theory interprets firms as agents that have limited information, are boundedly rational and settle for sub-optimal

outcomes rather than maximum profits (Simon, 1995; Cyert & March 1963; Pred, 1967; Townroe, 1972). It explores internal factors (e.g., age and size) that are important in the decision making process of the firm, and that lead to a particular location.

The study in Canada by Elgar and Miller (2009) also attempted to observe the development of the CBD. They also concurred with the observation that the CBD, the traditional central place for the metropolitan region, may be losing its economic function as a result of the combined impact of modern communications technology (reducing the need for face to face contact), the social tensions of the inner city, the social and private costs of congestion and the shift of the middle class to the suburbs (Cervero, 1989; Garreau, 1991; Stanback, 1991). The term 'CBD decline' was used with reference to the economic functions of the centre-city business district, specifically as the employment node for high-order tertiary functions: head office, business services, and financial institutions. Most moves were made within the CBD, in large part by expanding firms in search of more floor space. They concluded that the CBD continues to grow because it is there that high-order service firms will generally be born and will often choose to expand. Traditional CBDs differ substantially from their suburban counterparts, primarily in their density of activity and modes of commuting. The high density of activity in CBDs, which facilitates face-to-face interaction and information flows, is one of their primary comparative advantages. The dense concentration of activity is possible because CBDs typically are accessible by public transportation as well as by car. Public transport systems deliver larger numbers of people to small geographic areas than is possible by car, the predominant mode in suburban economic centres (Voith, 1998).

Firms may have different preferences of nearness to various services, other firms and organisations. For some firms that develop a product, nearness to knowledge-intense entities might be significant (Dettwiler, 2003, 2008). Local entrepreneurs tend to establish their businesses in places where they live for reasons of convenience, for example, a study in the South West of England showed that in excess of a third of location decisions were influenced by the nearness to the founders' home (Keeble & Tyler, 1995).

Location decisions by firms can be divided into two groups: those by new firms that are looking for their first location and those by relocating firms that decide to move from their current business place. From the relocation perspective, Van Dijk and Pallenberg (2000) found that firm size was significant to the propensity of firms to relocate, with small firms (those with 1-10 employees) showing a higher propensity to relocate than medium and large firms. Earlier studies referred to by Alexander (1979) revealed that office firms surveyed from the 1960s and 1970s in large cities chose the following important factors for relocations: lack of space, leasing costs, accessibility to employees, prestige and inertia.

In observing how office firms conduct their location search process, Elgar and Miller (2009) has highlighted the following important factors in the relocation decision: lack of space, lease cost, physical condition of location and visibility of location, accessibility to client and employees, prestige of location and lease terms. Agglomeration plays a marginal role for small and medium office firms. Their study indicated that accessibility factors are substantially less important for the location decision than space and physical condition considerations. Their study also found that office firms generally do not conduct utility maximising search behaviour as suggested by economic location theory; a strong

indication that office firms are satisficers to a large degree in their location behaviour, reluctant to invest the time and expenses needed to gain more information about the available location market. The majority of the firms restricted their search to a small area or did not search at all. As most of them also did not use the services of agents, they further decreased the reliability of perfect knowledge assumption.

It was also postulated by Elgar and Miller (2009) that in the first stage of a search, office firms would consider proximity and good accessibility to certain places/area in a centre as their main concern. At this stage, office firms decide on the area they are going to search in by considering the following main variables: area/zone specific variables (accessibility, distance from CBD, etc). Then in the next stage, the decision on the specific location to be chosen is mainly influenced by location-specific attributes (cost, floor space, physical conditions, etc). Both in the push and pull stages of the location decision, office firms seem to be more interested in the attributes of the location itself and consider the area of the location and the accessibility as less important.

When comparing the nature of firms in choosing to be in a metropolitan area, Frenkel (2001) discovered the following factors: availability of physical infrastructure, Government, convenience, prestige of the region, high level of transport and telecommunications, proximity to similar plants, proximity of cheap and non-skilled labour, support of the local authority, connection to academic and research institution, proximity to ex-location, proximity to services, proximity to markets, and proximity to investor. In considering the factors for operating locations decisions of small firms, Mazzarol and Choo had included factors which relate to pollution and nearness to where the staffs live.

Louw (1998) in a study of locational choice of behaviour of large migrating offices in the Netherlands postulated that there were 3 phases of the decision making process: 1) orientation phase; 2) selection phase; and 3) negotiation phase. Special factors comprising geographical position, accessibility, parking possibilities, proximity of facilities and public transport, and quality of spatial surroundings play important roles in the first two phases. Financial and contractual factors are more important in the third phase. In the corporate sector, it is postulated that the most important motives in the location decision process are the lack of space for expansion, business organisation reasons, and the integration of settlement and premises.

Studies have also been conducted to explore the pull and push factors on location, building and organisational levels (Pen, 2002). Many of the factors that relate to these levels are from the behavioural context and are location-specific, which relate to the premises, organisation or environment. Some of the push factors are: no possibility of expansion, premises not representative, parking possibilities, transport of goods, accessibility by car, location of consumers and clients, location of suppliers, and quality of living environment (Pallenberg & Wissen , 2002)

A summary of the aspects related to the locational factors which were reviewed and included in the various sections of this study is summarised as below:

Table 3.2: Summary of Selected Factors or Criteria with respect to Location

No	Selected Factors/Criteria	Literature Sources
1	Branding/Image	Sing *et al* (2004), Frenkel (2001), Elgar and Miller (2009), Dent and White (1998), Carn *et al.* (1988), Hoffman et.al.(1990), Jakobsen & Onsager (2005)

2	Access to Market, Skilled Labour Pool, Cheap Non-Skilled Labour	Dunse and Jones (2002), Mazzarol and Choo (2003), Van Dijk and Pallenberg (2000), Frenkel (2001), Elgar and Miller (2009), Krugman (1995), Fujita *et al* 1999, Sing (2006), Malecki (1979), Thwaites(1982), Oakley (1984), Johansson and Nijkamp (1987), Frenkel (2001), Pallenberg & Wissen (2002), Pittman and McIntosh (1992), Stainbach (2002), Wyatt (1999)
3	Proximity to Similar Business, Complementary Business, Support services suppliers, Raw materials, Investors, Financiers, Specialised Services, Government Authorities related to business, Competitors in similar business, Amenities, Factors of production, Production cost, Face-to-face contact, Clients	Abel (1994), Mazzarol and Choo (2003), Sing *et al* (2004), Pittman and McIntosh (1992), van Dijk and Pallenberg (2000), Frenkel (2001), Pen (1999), Appel-Muelenbroek (2008), Dent and White (1998), Coffey and Sheamur (2002), Moah et.al.(2008), Frenkel (2001), Pallenberg & Wissen (2002), Wyatt (1999), Jakobsen & Onsager (2005), Dettwiler (2003), Bollinger (1998), Ihlanfeldt & Raper (1990)
4	Access to Public Transport & Terminal, Transport Infrastructure, Major Trunk Roads/Highways, Private Vehicles, Commuting Cost	Dunse and Jones (2002), Abel (1994), Mazzarol and Choo (2003), Sing *et al* (2006), Leishman *et al* (2003), Pittman and McIntosh (1992), Sing *et al* (2004), van Dijk and Pallenberg (2000), Pen (1999), Appel-Muelenbroek (2008), Dent and White (1998), Krugman (1995), Fujita *et al* (1999), Abel (1994), Frenkel (2001), Ball (1998), Evans (1985), Goddard (1975), Hoffman et al (1990), Pallenbarg & Wissen (2002), Louw (1998), Voith (1998)
5	Proximity to Sub-centres	Hui and Tse (2004), Pen (1999), Clapp (1980), Bollinger et al (1998)
6	Market Size	Krugman (1995), Fujita *et al* (1999)
7	Level of Criminal rate	Pen (1999), Appel-Muelenbroek (2008), Abel (1994)
8	Corporate Headquarters	Voith (1998)
9	Convenience to Residential Area, Pollution	Mazzarol and Choo (2003), Keeble and Tyler (1995)
10	Traffic condition	Van Dijk and Pallenberg (2000), Elgar & Miller (2009)

3.7.2 Financial/Cost

The financial or cost aspect has been a consideration for new office space decisions by office occupiers (Dow & Porter, 2004; Haley & Kampa, 1989; Gibson, 2000). In considering the costs associated with office occupation, a tenant must truly know the future of its business to be in a position realistically to forecast long-term space needs. When considering office space choices and making the decisions, tenants must carefully compare the alternatives and associated issues and expenses when selecting the new offices. This includes, among others, rent/square footage. This would also include restructuring decisions which only make sense when it is economically beneficial over the long term (Dow & Porter, 2004).

A prospective tenant's priorities are usually a series of functional and subjective considerations, such as: 1) Lowest cost of occupancy - what is the effective cost of the property relative to others under consideration? 2) Added quality - will the final space selection have a desirable location and image for the business? 3) Rentable vs. Usable square footage - Is the space designed efficiently? 4) Maximum Services - what is available and provided by the building's management staff? 5) Amenities - Does the building have parking, conference facilities and others? Basically, most prospective tenants are looking for the optimal space at the lowest possible cost of occupancy (Haley & Kampa, 1989)

Gibson (2000) examined the criteria used to select new office space by importance and noted that 'other occupational' and 'efficiency of layout' appeared to be important but secondary criteria. The respondents were also asked to consider what financial criteria they would use to evaluate a choice between more than one appropriate office. Rental cost per square foot/metre was mentioned most often: by more than 90% of the respondents. This seems to reflect the tendency to focus on direct property costs. The study also identified the financial factors considered when selecting new offices. The factors are rental cost per sq foot/metre, cost of fit-out, running cost of the building, total occupancy cost, cost of exit, accounting impact, cost of IT/Telecoms infrastructure, cost of office furniture, asset value, and cost of office administration. Beusker & Stoy (2009) quoting DIN 18960 mentioned that occupancy costs encompass the following cost types: 1) capital costs (external funds, equity capital, depreciation); 2) real estate management costs (labour costs, material costs. external services); 3) operating costs (costs of utilities, waste disposal, cleaning and maintenance of the buildings and external, structure, inspection and maintenance of

technical installations, security and control services, taxes); and 4) maintenance costs (costs of maintenance of the buildings, technical installations, external structures and interiors).

A study by Dixon *et al.* (2009) identified running costs as one of the criteria in the decision to move office. However, running costs (covering all the costs of running a building, including service charges and energy costs) were considered less important, as was design, with sustainability (e.g., sustainability features of the building) least important of all. From the aspect of sustainability, the focus from occupiers was much more on rental cost and other related costs in this category. A summary of financial/cost factors which were reviewed and included in the various sections of this study is summarised in Table 3.3.

Table 3.3: Summary of the Selected Factors/Criteria with respect to Financial/Cost

No	Selected Factors/Criteria	Literature Sources
1	Rental Rate	Gibson (2000), Dow and Porter (2004), Dent and White (1998)
2	Total Occupancy Cost	Gibson (2000), BRE research, Beusker and Stoy (2009), Blake (2002)
3	Cost of Fit Out	Gibson (2000)
4	Running Cost	Gibson (2000), Dixon *et al* (2009)
5	Cost of Exiting	Gibson (2000), Dow, Porter(2004)
6	Cost of Internal Infrastructure & Finishing	Gibson, (2000), Dow, Porter(2004)
7	Cost of Office Administration	Gibson (2000)

3.7.3 Building

A review of literature linking to the physical aspects of the office property reveals the various factors or criteria chosen for the specific aims of the studies. In looking at the future of office property, a study by Iron and Armitage (2003) has identified the modern business practices that would influence the physical property resource, which include the following: better environment for staff in the office, such as natural ventilation and use of natural light, and space with greater flexibility and adaptability.

Douglas (1996) specified that commercial buildings serve the purpose of accommodating the production process where people within them execute their tasks and where products can be stored. On the demand side, expectations, standards and requirements of building occupiers have increased owing to advances in technology and changes in economic conditions. Property occupiers and owners require their buildings to be attractively long-lasting and to provide stable and efficient internal environments. In other words, they want facilities that will be comfortable to occupy, cost-effective and efficient to run, and which will remain added-value assets. On the supply side many existing buildings, through accelerating wear and tear, dilapidation, premature degradation, neglected inadequate maintenance, or a combination of these factors, are failing to meet those expectations and demands. Douglas revealed the building performance criteria for the overall assessment of performance to cover some of the factors summarised in Table 3.4. These criteria were important in the determination of building quality and provided the basis for future research on the same topic.

In studying the achievement of considering whether the design/quality characteristics of office buildings (combined with the specific nature of an organisation's property requirements) will typically determine facilities' value for the occupier, Bottom *et al*. had conducted a study in 1997. This survey of standardized post-occupancy evaluation showed the perceptions of different groups of tenant organisations in office buildings in London. The results indicated that property requirements differ mainly in connection with factors associated with the building shell/common space, access and circulation, and tenant amenities. The legal, insurance and brokering organisations have a requirement for buildings that are of good quality and are well presented on the exterior. These three (3) sectors demand a greater degree of prominence and identity from the main entrances of

buildings, together with high quality reception facilities. The banking, insurance and legal sectors require higher levels of control over heating and ventilation services in their buildings contrasting with brokers. Thus it is observed that the economics effects of office properties are widespread and affect both the institution's owner and the business organisation as the occupier. A common link exists in that the design qualities afforded by an office building are of central importance to the operational performance of both parties. Furthermore, the effective management of an office building as an entity, which supports the activities of tenant organisations, will reap benefits for the owner and occupier alike. It was found that a common link exists in that the design qualities afforded by an office building are of central importance to the operational performance of both parties. Literature indicates that all tenant organisations are likely to be different and will interact with their buildings in different ways, and the suitability of premises can therefore be related to measurements of performance. Staff and clients or organisations are supported in their work activities by characteristics of each particular office building (Bottom *et al.*, 1997).

The physical characteristics of office building selected for the purpose of performance measurement in the study by Bottom *et al.* (1998) are: (1) Structure and Enclosure (2) Building services (3) Building shell and common space (4) Access and circulation (5) Tenant amenities (6) Tenants' specific work environment (details of the components of each part have been summarised in Table 3.4).

Previous evaluation of the physical characteristic of office buildings has focused on quality assessment, which includes local grading and classification schemes, service tools and

method (STM), real estate norms (REN), and building quality assessment. Clift (1996) suggested the Building Quality Assessment system (BQA) which divided office building into nine (9) categories that established a broad classification of office user requirements. The categories are: 1) presentation 2) space functionality 3) access and circulation 4) business services 5) amenities etc; 6) working environment 7) health and safety 8) structural considerations 9) manageability. BQA can be used as an aid for portfolio or asset management, rent reviews, investment appraisals, purchasing or selling properties, defining quality at briefing stage for new build and refurbishing, judging alternative design proposal, etc (Clift, 1996).

A further study by Ho *et al.* (2005) in Australia saw the development of another building quality assessment. It had six (6) categories and sub-factors for assessing CBD building quality attributes comprising: 1) presentation 2) management 3) functionality 4) services 5) access and circulation finding way to/around building (building way finding); 6) amenties for tenants (details of the components of each part have been summarised in Table 3.4. With CBD office building quality being a key factor in CBD office buildings' performance and its ongoing strategic contribution to a property portfolio, it is important to identify the key property-specific features that make the major contributions to CBD office building quality. Tenant preferences relate to efficiency of workspace and CBD office building service standards, whilst owner preferences largely focus on presentation aspects (Ho *et al.*, 2005).

Property characteristics have been included as the factors or criteria in tenant satisfaction surveys as well as facility selection factors (Dean & Lee, 2000; Alexander & Muhlebach, 1990; Susilawati, 2002). Baum (1993) in Susilawati (2002) stated that quality of building

consists of plan layout and height of room, internal specification, external specification and durability of material. The internal specification comprises services and finishes. The external specification includes public areas and elevators. Susilawati (2002) included five categories in the evaluation of tenant satisfaction in her study: location, function, control and management, environment, and services. An earlier observation by Wadworth (1996) revealed that tenants are looking for more efficient space, more flexibility in technological capabilities and buildings which incorporate new services. Tenants who are dependent on data transmission, such as financial services, want a more secure and reliable power supply. More tenants are seeking high-tech spaces that have UPS systems, backup systems in generators, improved roof access for communications, high-speed wiring (fibre optics), and raised floors to allow ease of access for data cabling upgrades. Management companies have been asked to take on facilities' services, such as cafeteria, health facilities and mailrooms (Wadsworth, 1996).

When specifying the physical requirements in meeting tenants' need, IT access demands are observed to be on the rise; support services such as server rooms, are increasingly located off-site, further reducing many tenants' need for office space. Apparently, tenants increasingly want landlords to anticipate what their requirements, ranging from secure environments to amenities. Across the board, security services that tenants can see, for example, lobby security, are what really matters. Tenants now demand multiple power sources to ensure reliability due to the increased use of sophisticated technology. From office temperature to elevator speed, tenants want a problem-free environment. It was also noted that three maintenance and operations' complaints dominate: heating, ventilation and air-conditioning, cleanliness, and elevators (Blake, 2003).

To meet the requirements of the knowledge-based industries demands new design challenges in terms of the provision of environments that enable and encourage staff to share their knowledge. As the commercial buildings cater for tenant organisations that operate knowledge-based businesses, it will be worthy to acknowledge the specific building requirements. It is likely that office buildings will, in the future, feature larger uninterrupted floor plates (with the traditional central core replaced by a side core) and make growing use of open-plan layouts (Gleeson, 2001). Greater heterogeneity in all facets of the physical office environment, i.e., location, design, interior layout, size, shape, etc., will likely emerge in the future.

At a physical level, one of the major features of the modern office building has been the proliferation of technology, especially the Internet, email, and networked computer systems. Hartkopf *et al.*, (1993) suggested that the technological requirements for buildings designed to accommodate the needs of the modern office tenant which include broadband copper and fibre-optic connection to public communications carriers and under floor - for tenants to install integrated modular cabling systems for voice and data. It was further revealed by Jones Lang LaSalle's survey of the New Technology in 2001 that broadband connectivity is crucial and both fibre and wireless will become essential building and location components for all office occupiers. Thus, it can be seen that the impact of information and communications technology (ICT) developments on the office sector has been well documented in recent years. The importance of understanding is the latest technology and keeping up-to-date with technological improvements is crucial (Spurge, 2002, Spurge & Almond, 2004).

A Building Research Establishment (BRE), UK research project (2000) attempted to measure performance by reference to the end user. The aim of the project was to investigate the factors governing satisfaction with a built facility in terms of the needs of the different customer groups who are the ultimate end users. It was discovered that tenants' requirements covered twenty nine (29) factors. The factors that relate to the physical aspect have been included in Table 3.4. It would be useful to consider them in considering the factors to be adopted in this thesis.

The Centre for the Built Environment (CBE) and the Fisher Center for Real Estate and Urban Economics, US in June 1999 commissioned a study to understand the emerging needs of leading-edge office tenants. The most critical facilities' issues identified by CBE and Fisher Center are: cost, location, building configuration, infrastructure, image and amenities/competition, alternative officing/market cycle, and green building corporate philosophy/culture (Center For The Built Environment, 1999).

In investigating several cross-sectional analyses on how the design and other characteristics of class A office buildings affect rents, vacancies and a profitability index, Vandell and Lane (1989) discovered the type of finishing, internal as well as external, has great influence upon the wear and tear of a building, and hence on the degree of its user-friendliness and the costs of maintenance. Bouwer *et al.* (2004) have also made observations from building design architecture and facility management literature and argued that the arrangement of space is an important part of the re-engineering of the way that business takes space; that the built form can be used to facilitate and promote flexibility, knowledge exchange and responsiveness in an unstable business environment

A summary of the factors with respect to Building which were reviewed and included in the various sections of this study is tabulated in Table 3.4.

Table 3.4: Summary of the Selected Factors or Criteria with respect to Building

No	Selected Factors/Criteria	Literature Sources
1	Building Presentation (age, height, design of entrance and foyer, reception and common area finishes, entrance and reception, modern prestigious building, presentation of external finishes, building visibility, building image/identity, visibility, internal space finishes, external façade, architectural design and finishes)	Baum (1993), Susilawati (2002), Gleeson (2001), BRE Research (2000), Vandell and Lane (1989), , Bottom *et al* (1998), Gat (1998), Ho *et al* (2005), Center For the Built Environment (1999), Abel (1994), Douglas (1996)
2	Building Management (security & access control, responsible management and maintenance team, maintenance policy, cleaning/housekeeping services, energy conservation & recycling policies, building automation & energy management systems, safety policy & procedure, fire prevention & protection, responsive to service request, after hours operations)	Blake (2003), BRE research (2000), Babcock (2003), Bottom *et al*. (1998), Ho *et al* (2005), Abel (1994)
3	Space Functionality & Atmosphere (floor plate size, floor-ceiling height, size, flexible space layout, space orientation, geomancy, comfortable space, space for future expansion, space efficiency, column layout & sub-divisibility, floor loading, under floor trunking, riser for ICT and systems, adequacy of natural lighting, energy efficient/green buildings, design and space planning, view, raised floor	Gleeson, (2001), Spurge and Almond (2004), Vandell and Lane (1989), Baum (1993), Bottom *et al* (1998), Ho *et al* (2005), Brouwer *et.al*.(2004), Center For The Built Environment (1999), Iron and Armitage (2003), Douglas (1996), Wadsworth (1996), Blake (2003)
4	Services (toilet & sanitary, air-conditioning & ventilation, electrical, modern IT & telecommunications, fire fighting systems, standby power, broadband & fibre optic connection, wireless communication, energy generating capacity, control of M& E services, control of noise	Blake (2003), Hartkopf *et. al*. (1993), Irons and Armitage (2003), BRE research, Spurge and Almond (2004), Baum (1993), Bottom, *et al* (1998), Ho *et al* (2005), Center For The Built Environment (1999), Wadsworth (1996), Douglas (1996), Lizieri (2003)
5	Access & Circulation (ease of use of entrance, entrance capacity, location of lifts, stairs & corridor, lift capacity, lift speed, lift performance and control, good lift and loading bay, capacity of stairs, adequacy of good access & circulation, capacity of corridors, no of car parks, car park ingress/egress, building wayfinding, disabled circulation, loading bay provision)	Blake (2003), Gleeson (2001), BRE research (2000) , Bottom *et al* (1998), Ho *et al* (2005), Abel (1994), Dent & White (1998)
6	Amenities (food & beverage outlets, sports & recreation, landscaping, banking, retail, vending, catering services, conference facilities	Blake (2003), BRE research (2000), Bottom *et al* (1998), Ho *et al* (2005), Wadsworth (1996)

3.7.4 Lease

Like any other production factors, business accommodation has a price tag; the cost is determined not only by the quantity and quality of space used, but also by the form of tenure. There are three (3) basic forms of tenure: rent, lease, and ownership. Each of these forms has its own financial, legal, and physical benefits and drawbacks. The main advantage of renting office space over owning an office building is that the renter has extra flexibility. This is due to the following reasons: the company assets are not tied up giving more options to adjust to other corporate activities (Smith & Wakeman, 1985; Manning, 1991).

Real estate leasing is a contractual arrangement between an owner and a user of a property, which specifies the periodic rent, the term and numerous provision clauses including provision for operating management and maintenance services. An important issue in leasing is the lessee's potential usage of the property (Mooradian & Yang, 2002). A leasehold estate is created when a landowner (the 'landlord' or 'lessor') grants a tenant (or known as 'lessee') the right to occupy the owner's property for a specified period of time in exchange for some form of consideration which is called rent, as proposed by Kyle and Baird (1995). It is usually created by a written document ('the lease') which states that the property is 'demised' or 'let' to the tenant for a particular period and specifies the term and conditions of his occupation, especially the amount of rent he has to pay and how and when such rent has to be paid. This lease terminates at the end of this period and the right to possession reverts to the landlord (Lye, 1990).

Tenants, short or long term, want more options and flexibility. More tenants are looking for options to expand three years into the lease instead of synchronizing it with expiration

(Wadsworth, 1996). On the other hand, knowing what tenants are looking for helps landlords anticipate their needs and keep space filled. No matter how the space is configured, and who pays for improvements, leases should be as flexible as possible. Tenants are cautious about making long-term leasing decisions, especially during unstable economic conditions (Blake, 2003).

The changing business practices and attitudes to space is that businesses require more flexibility, not only in terms of the physical characteristics of buildings but also in terms of leasing arrangements. The identification of core and peripheral activity has already helped to fuel the increasing provision of serviced offices. The length of the lease has different impacts from the landlords' and tenants' perspectives. Landlords typically like longer term leases and are more willing to make concessions for such leases. With a long lease, the landlord enjoys the financial security of a regular rental stream over a number of years. In addition, the landlord can avoid the hassle and expense of re-leasing the space. From the tenant's point of view, a long term lease has both benefits and risks. The benefit would be that the premises are available at a predictable cost for the long term. The risk is that the company may outgrow the space, may need less space as its business contracts, or is locked into paying what turns out to be above-market rent if demand for rentals subsequently declines. The ideal lease length is one that matches the business needs of both the owner and the occupants. Unfortunately, these two interests do not usually coincide. A study conducted earlier in Australia by Rowland (1999) revealed the five most problematic lease terms in rank order. They are: lease length, break clauses, assignment and sub-letting, repairs and insurance, and rent review type. Upwards-only reviews are an important element of occupier concerns regarding review type, but the study highlighted

that lease length is the major concern of all occupiers, with a significant mismatch between business planning horizons and length of occupation. This was particularly highlighted as a problem for international occupiers, who were also very concerned about other clauses which impacted on the length of occupational liability and ease of exit from the premises, such as break clauses and assignment (Rowland, 1999).

In Malaysia, the word 'lease' conveys the meaning of 'to rent' which is to have the benefits of something in return for payment of a certain sum of money. Traditionally, this relationship existed in the context of land and landed property. The owner of the property allows another to occupy it and in return the other person pays money in a lump sum in advance or periodically such as weekly, monthly, quarterly or yearly. The payment is referred to as rent. However, the word 'tenancy' has been used for letting for short periods. When such a letting is for a longer period, it is called a lease. In the context of the National Land Code 1965, which only applies in Peninsular Malaysia, a tenancy is for a period of up to three years. Any longer than that and it becomes a lease. The terms 'lease' and 'tenancy' are often used interchangeably, as with the terms 'landlord/lessor' and 'tenant/lessee'. Land ownership in Peninsular Malaysia is governed by the National Land Code 1965 (NLC), in force since January 1966. (Buang, 2005).

Under the National Land Code, all leases have to be registered for with the letting to be endorsed on the title deed and therefore in the Register of Titles. The registration is thus highly beneficial to the lessee because his interest in the title is effectively made known to third parties. Any person taking subsequent charge does so subject to the existing lease. On the other hand, a tenancy is exempted from registration. Therefore, if a third party is

buying the land or creating a charge, such a person may not know about the tenancy that is not registered. Leases or tenancies may be created for a fixed period of time. As far as leases are concerned, the maximum period for which it may be granted is 99 years in respect of the whole of the land and 30 years in respect of part of the land (Teo, 1995).

Office lease transactions takes place in the context of specific market conditions and under varying contract terms. The rent per square metre a tenant is willing to pay does not solely depend on the specific office property, but also on the office space market conditions and transaction-specific aspects (e.g., contract terms, negotiating skills involved actors).This market context factor and the contract terms influence the transacted rent per square metre, but cannot be kept constant and should therefore be incorporated into the analysis (Koppels, 2007).

Essential Provisions of Valid Lease

The effects on rents of several lease covenants have been modelled in a wide variety of ways in recent years in other countries. Some approaches are of more practical application to lease negotiations than others. The essential provisions of a valid lease are as follows (Adnan & Tey, 2008):

- *Lease Lengths*

  The length of the lease has a significant impact on the rental rate. Landlords typically like longer term leases and are more willing to make concessions for such leases. The lease period in Malaysia is usually 2 to 3 years with an option to renew. The landlord normally requires 3 to 6 months notice of tenants' intentions to exercise his option for the former and 2 months' for the latter.

- *Options to renew or break leases*

  According to Williams (2002), an option to renew the lease amounts to an offer by the landlord to grant a new lease and is normally contained in the lease. The option usually provides for the new lease to be granted for a term equal to the 'old' lease but at an increased rent. If the option does not contain a formula and machinery for ascertaining the rent for the new term it may be unenforceable.

- *Rent Review Provision*

  It is generally understood that landlords prefer frequent (upwards only) market rent reviews unless a large surplus of space is imminent, in which case fixed increases are favoured. Often, tenants argue for infrequent rent reviews tied to an index of affordability (consumer price inflation or as a percentage of the gross sales of the business).

  An upward only rent review gives an option to the landlord to demand a rental increase unless market rents have declined since the start of the lease (or since the previous review). Since in Malaysia, the shorter period of leases is being adopted, rental will be renegotiated for review at the end of each term, at a mutually agreed rate between both parties based on market conditions.

- *The liability for property responsibilities and expenses*

  The maintenance and management of properties may be carried out inadequately when there is insufficient incentive for the responsible party to operate the property in the way that the other party would like (and there are difficulties in specifying, monitoring or enforcing repair and management clauses). Benjamin *et al*. (1995, 1998) indicated that the tenant's inclination to overuse and/or under maintain leased premises imposes a cost, initially on the landlord that would be expected to

cause the market for leased space to fail. The tenant has no interest in preserving the residual value of the property and this neglect would not exist in owner-occupied properties. In Malaysia, the landlord is responsible for the upkeep of the common area whilst the tenant is responsible for the internal area of its tenanted area. The landlord is responsible for the insurance of the building, excluding fittings and fixtures installed by the tenant, against damage by fire or such risks as the landlord deem fit. The tenant is to keep insured the internal premises, including any fittings, furniture, chattels and properties of the tenant, throughout the renovation and tenancy period at their own cost.

- *Leasing incentives*

  Leasing incentives are concessions given to tenants to entice them into signing new leases. In most instances, they can be priced by assessing their effects on the cash flow from the property (Bond, 1994; Jefferies, 1994).

According to Lye (1990), it is essential for a valid contract to contain the name of the parties, the property, the term and its commencement, rent and special covenants. Whilst considered as a contract, the tenancy agreement is governed by Part 15, Part 18 Chapter 7 and the Sixth Schedule of the National Land Code (Act 56) of 1965.

Commercial leases tend to be shortest in Asian countries where landlords look after the properties, with partial or no recovery of operating expenses is common. In Western Europe, leases in many countries are longer (with statutory minima or renewal rights in some countries). Landlords manage and maintain their premises but, since the 1980s, service charges have become the norm in many countries

(www.colliers.com/content/Attachment/Sweden/WWLGSummary.pdf). The very long leases in England usually pass all responsibilities, including structural repairs and inherent defects, to the tenants.

From an earlier study among office occupiers of multi storey buildings, it was found that clauses within a lease/tenancy agreement which can cause problems are: Lease Length, Break Clauses, Assignment and Sub-letting, Repairs and Insurance, Right to Renew, Rent Review, Termination Clause, Payment of Rental, Outgoings and Deposit, Alteration and Renovation Clause, Fitting Out Clause, Compliance to Law and In House Regulations, and Use of Premise and Indemnity (Adnan & Tey, 2008).

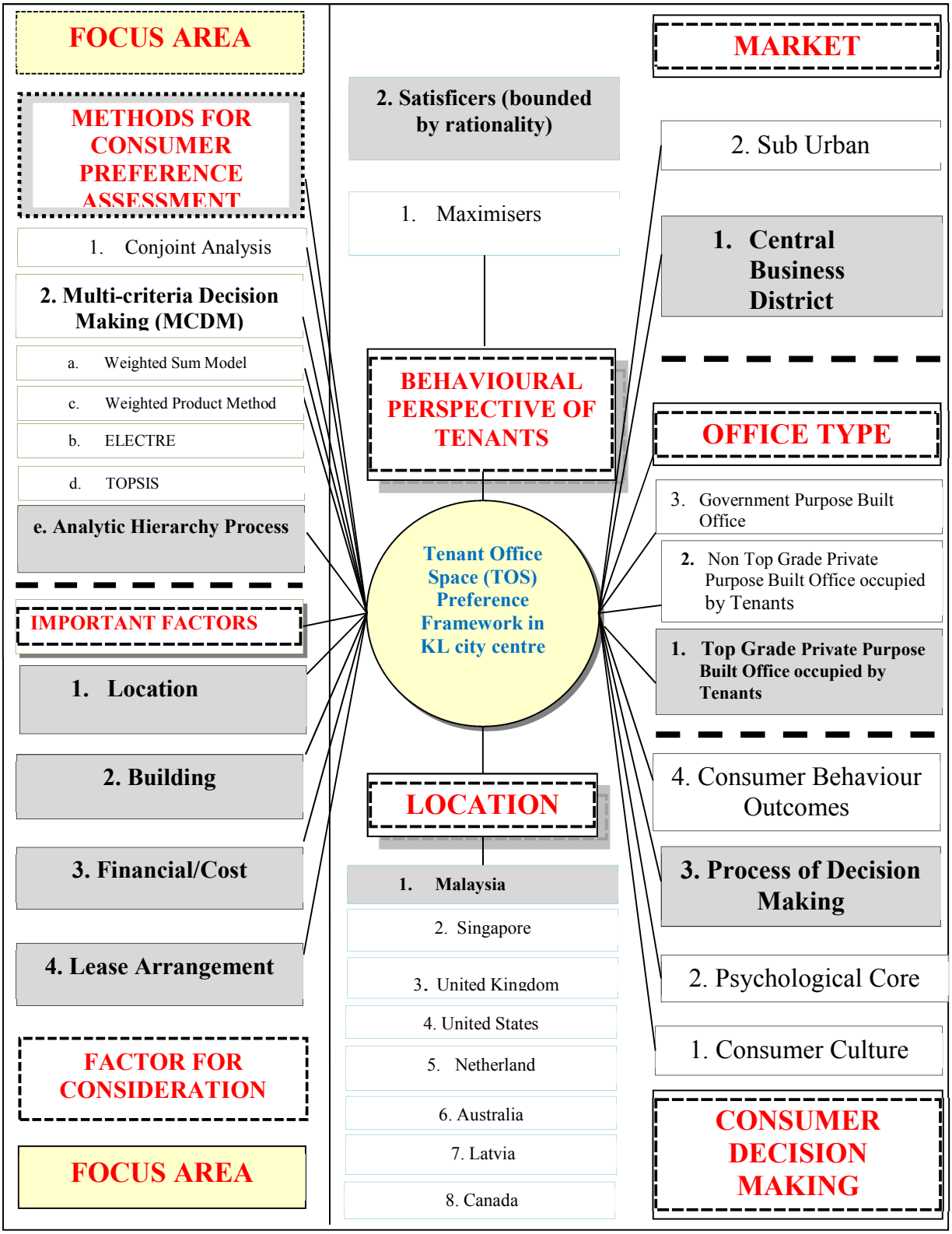
A summary of the factors with respect to Lease conditions which were reviewed and included in the various sections of this study is shown in Table 3.5.

Table 3.5: Summary of the Selected Factors or Criteria with respect to Lease

No	Selected Factors/Criteria	Literature Sources
1	Use of Premise	Mooradian and Yang (2002)
2	Indemnity	Adnan and Tey (2008)
3	Compliance to Law and In House Regulations	Adnan and Tey (2008)
4	Fitting Out Clause	Adnan and Tey (2008)
5	Alteration and Renovation Clause	Adnan and Tey (2008)
6	Payment of Monies Clauses	Adnan and Tey (2008)
7	Termination Clause	Adnan and Tey (2008)
8	Review/Renewal Terms	Adnan and Tey (2008)
9	Repair and Insurance	Adnan and Tey (2008)
10	Assignment/Sublet	Adnan and Tey (2008)
11	Break Clause	Adnan and Tey (2008), Dent & White (1998)
12	Lease/Contract length	Adnan and Tey (2008), Dent & White (1998)
13	Incentives/Rent Free Period	Adnan and Tey (2008)

3.8 SELECTION OF THE SCOPE OF THIS STUDY

In conducting the research for this study, it is necessary to identify the scope of the area in which the research shall be carried out. In terms of the location for which the study is carried out, Kuala Lumpur city centre, in Malaysia, shall be the selected location and office market area (see section 2.4). The top grade private purpose-built office buildings occupied by tenants have been selected in this research. The profiles of the selected buildings are mentioned in section 2.5. Having considered the tenants as consumer of office space, the consumer decision making process of assessing the office space involves the decision making process in the hierarchy of consumer decision making model. Within this process, the behavioural perspectives of bounded rationality or satisficing have been chosen to view the tenants as those with limited capacity to account for all the available information. By identifying the four main areas of factors for selection of office space, the tenants are exposed to multi-criteria of choices and thus the multi-criteria decision making techniques are chosen to uncover the important factors that the tenants in this research shall eventually choose. A summary of the described scope is shown in Figure 3.3.



[Note: The highlighted boxes (shaded grey and marked red) are the focus areas in this study

Figure 3.3: Mapping of the scope of research drawn from the literature
Source: Adapted from Abdullah, A A (2010), An Empirical Study on the Factors Influencing the Success of Planning Approval of a Development Project: Malaysian Context, (Unpublished PhD Thesis), UM, Kuala Lumpur

3.9 THE CONCEPTUAL APPROACH TO EXAMINING TENANT OFFICE OCCUPATION DECISION MAKING

This section presents the conceptual framework of the examination of the concepts and factors that influence office occupation decision making. The review of literature presented prior to this section provided the overall overview on the basis that the conceptual framework was established from the emerging concepts in decision making and office occupation.

Having considered the office space offered at purpose built office buildings at the city centre of Kuala Lumpur as a 'product' and tenants as 'consumer', it would be useful to conceptualise the proposed study in the derivation of the tenants' preference for the important factors of consideration. Thus, by the identification, the framework of tenant office space decision making can be developed. Figure 3.4 depicts the plan of approach. By considering the behavioural approach of research by including the profiles of the tenants as highlighted by earlier studies (Greenhalgh, 2008; Leishman & Watkins, 2004; Sing *et al.*, 2004), tenants are assumed to be bounded by rationality in making office occupation decision (Simon, 2000). Since the office space selection decision involved spaces within the city centre, the decision making considerations are mainly property-specific (Wrigglesworth & Nunnington, 2004). Though this is the case, the factors for consideration comprise those discussed in the earlier section 3.7.

To gauge the preferences by different consumer groups within the attributes that the product possesses, a method that is able to assist in making the final selection is required. To choose an attribute which can be defined as characteristics or qualities that describe an

object (Babbie, 2001) may be taxing. It would be useful to understand why different profiles of customers or tenants in this study select different attributes. Thus knowing the relative weighting of the importance of each of the product's attributes would provide insightful information in understanding the choices that consumers make. From the customer preference perspective, the tenants' preference of office space is capable of measurement. Several methods exist in theory and practice to survey consumer preferences. The common technique in marketing is conjoint analysis. However, recent studies have found that other tools are also applicable. They include Analytic Hierarchy Process (AHP), which is one of the Multi-criteria Decision Making (MCDM) groups of methods.

Conjoint Analysis (CA) is a decompositional method, measuring preferences on complete alternatives described by several attribute levels of at least two attributes. The overall evaluations of these alternatives are then decomposed into part-worths of the respective attribute levels. The total utility of a product is computed as the sum of the part-worths of the respective attribute levels (Helm *et al.*, 2008). It can be used to simulate real situations in which consumers may react to changes in current products or to new products (Green *et al.*, 2001). It is also used to determine how consumers trade off different attributes of a product or service (Jansson *et al*., 2003). It has been applied broadly in many areas, which include retailing (Toombs & Bailey, 1995), wood furniture (Anderson & Hansen., 2004) and lottery (Koo & Koo, 2010). There has been application of this method in property and real estate that include among others, researches by Levy (1995), Mar Iman *et al* (2008); Mar Iman (2011) and Fu (2009).

An alternative method of measuring customer preference as suggested by Helm *et al*. (2008) is Analytic Hierarchy Process (AHP). It is a common method in decision analysis with a wide range of applications (Saaty, 1994; Schmoldt *et al.*, 2001; Zahedi, 1986; Vargas, 1990; Golden *et. al*., 1989) but rarely used in marketing. AHP was designed as a method to support a decision maker in selecting alternatives from a set of feasible alternatives. This is done by dividing the decision problem into a hierarchy of several goals and alternatives. AHP asks for the weights of the attribute and utility values of the attribute's levels in a compositional manner.

Both CA and AHP fulfil the requirements for measuring preferences but a comparison of both methods concerning the quality of the results is needed to select the method that best fits a specific design problem. Previous studies that compare CA and AHP have produced conflicting findings on the applicability of both methods and the quality of the results they obtain. Tscheulin (1991; 1992) quoted by Helm *et al.* (2008) concluded that CA outperforms AHP for the prediction of choice in an experiment and that they are equally suited to predicting real choices. Mulye (1998) found no relevant differences concerning the quality of the results between both methods in a first study, while slight advantages of AHP were observed in the second one. Finally, Helm *et al.* (2004) came to a conclusion that AHP performs at least slightly better than CA for several measures used. From a theoretical point of view, several similarities concerning the goal and general approach of the methods are obvious. Although both methods were developed with a different aim, they can be used in similar research contexts. Helm *et al.* (2008) made a comparison of the two methods, performing paired comparison, although other evaluation tasks are also possible with CA.

Table 3.6: Conceptual Comparison of AHP and CA

	CA	AHP
Pre-condition	Preferential independence of the attribute	Preferential independence of the attributes
Application range	Design problems	Selection problem and/or design problems *
Survey form	Decompositional	Compositional
Scale used	Ordinal or interval scale	Ratio scale
Utility model	Additive part-worth model	Weighted additive utility model
Results	Part-worths of all attribute-levels	Relative preference of attribute-levels and attribute
Interview expense	(Complex) evaluation of complete stimuli (ranking, rating or pair comparison)	Many but simple pair comparisons
Respondents	Market segment on basis of individual Customers	Individual decision makers
Applicability	Up to six attributes with two to four levels**	Many attributes possible with up to seven to eight attribute levels

Note: * For selection problems, a complete hierarchy is used, while design problems require an incomplete one

**See Green and Srinivasan (1990). The same also applies for newer developments like Choice Based Conjoint (2002)).

Source: Helm *et al*. (2008)

In an empirical study of comparing the use of CA and AHP, Helm *et al* (2008) made several observations regarding the applicability of both methods. Respondents gave a higher rating for AHP since its questions are clearer and easier to answer. Furthermore, the AHP questionnaires can motivate the respondents more than the CA evaluation tasks. Answering AHP questionnaire takes significantly less time compared to CA so the AHP surveys more information in a given time span (Helm *et al.*, 2004). Helm *et al.* (2004) found that CA is a better choice in relatively simple decision problems whereas AHP is a better method in more complex problems.

Taking into account the many numbers of attributes and attributes levels to consider in making the office occupation decisions, the preference measurement of tenants in this study view the use of Multi-criteria Decision Making Methods (MCDM) methods with AHP as the selected preference method.

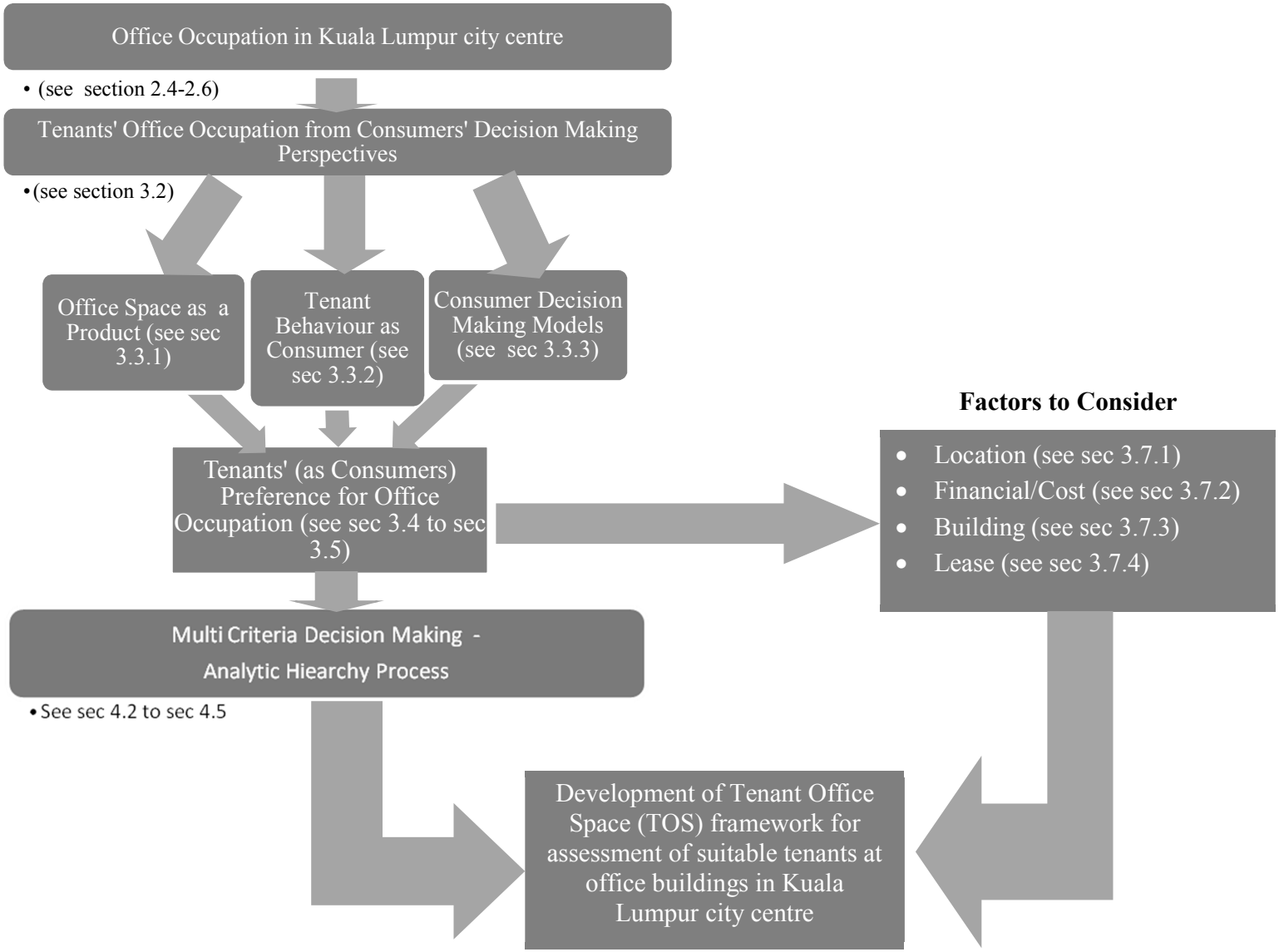


Figure 3.4: Conceptual Framework for Development of Tenant Office Space (TOS) Framework

3.10 SUMMARY

In this chapter the decision making concepts in office occupation and the factors that are relevant in office occupation decision making were discussed. The behavioural perspectives in consumer decision making is discussed in relation to the role of tenants as consumers of office space. Drawing on the concept of bounded rationality or satisficing in making decisions, the main consumer decision making models were discussed. In identifying the relevant factors that are considered in office occupation generally, the factors under the main identified areas of location, building, lease and financial/cost were discussed. Having identified the factors, the discussion of how the tenants' preference can be measured is made by comparing the common methods used. Finally, the conceptual framework of the development of the Tenant Office Space (TOS) framework is developed to provide the roadmap for the achievement of the objectives of the research.

CHAPTER 4

MULTI-CRITERIA DECISION MAKING

4.1 INTRODUCTION

As indicated in sections 3.7, four (4) main areas have been identified for tenants' preference selection for suitable office space. Under each area, there are many levels of attributes that may pose a problem to decision makers when evaluating office space. In this chapter, the decision making methods encompassing the multi-criteria decision making methods (MCDM) shall be reviewed. Section 4.2 provides an overview of the preference measurement perspective required for the study while Section 4.3 introduces multi-criteria decision making (MCDM) methods in solving problems. Section 4.4 outlines the need for decision aids for multi-criteria problems and Section 4.5 outlines the techniques available in MCDM. Section 4.6 provides the detailed description of Analytic Hierarchy Process (AHP) method for the development of the Tenant Office Space (TOS) framework. Section 4.7 provides the uses of AHP in general and its application in office preference measurement. Finally, Section 4.8 provides the summary of the chapter.

4.2 PREFERENCE MEASUREMENT

4.2.1 Difficulties in Evaluating Suitable Tenants to Suit Office Space at Kuala Lumpur city centre

The preference measurement for an existing and new product requires gauging customers' needs at different levels of decision-making. Therefore, the numerous arrays of attributes

of an office space may lead to the difficulty of making an assessment of the most suitable tenant to suit available office space.

It is apparent that there are many categories of tenant organisations occupying the office space at Kuala Lumpur city centre. From a survey of tenants' organisations which was conducted during the period of November 2009 to January 2010 (see Section 2.6), it was found that the three (3) main categories of organisations are the main sectors, which fall under the categories of: Banking & Finance, Oil & Gas, and ICT & Media. These three (3) categories occupy approximately 40% of the space by organisations which form the majority of tenant occupants at these buildings. These categories of services fall under the definition of the producer services which was highlighted in previous studies (Daniels *et al.*, 1986; Marshall, 1988; Morshidi, 2000) to be the main contributor of service activities in major cities.

There are so many choices of office space in various office buildings from which these different types of tenant organisation may choose. Each office building offers an array of attributes from which the tenants may choose. Knowing the different combination of attributes within the preferences of tenants may assist the owner/manager of the office building to match the office space within the best option that they may have. In the case of location, the positioning of the building at a particular site may not be of importance should the attributes described under location be adequate to meet the tenants' preference criteria. Thus, gauging the preferences of tenants in the form of defined criteria may be difficult as there are limits on rationality due to the limitation of the human brain (March & Simon, 1958). Comte and McCanna (1988) found that human minds cannot deal with

many matters at one time. When dealing with highly complex matters, a structure is needed so that the person can consider the issues one at a time, sequentially, to enable him or her to differentiate and choose the appropriate option from the available alternatives. Malhotra's (1982) empirical study revealed that human beings experience information overload and the accuracy of their choice decreases when the number of alternatives is larger than five and the number of attributes is larger than 10. Thus, there is a need for an assessment tool that can be used to aid the decision making.

It can be that one category of tenant organisation may choose one attribute such as location with different weightage on the next attribute levels, in comparison to another type of tenant organisation. As there can be many combinations of office attributes which one type of tenants may choose over another, it may be worth developing an attributes' suitability matrix that would be able to map out the varying degrees of importance, signifying the different weights given to each attribute.

As it is noted that there are multiple attributes involved in the preference selection for office space by tenants, it is worthwhile examining the appropriate methods that can be adopted from the MCDM methods. A multi-criteria problem may be defined as a situation in which one has a set of criteria to consider on a set of alternatives, in order to: 1) determine the best alternative or a subset of alternatives (choice problem); 2) rank alternatives from best to worst (ranking problem), or; 3) divide the set of alternatives into subsets according to some norms (sorting problem) (Wong, 1999).

4.3 MULTI-CRITERIA DECISION MAKING (MCDM)

It is useful to note of the extent of decision making structure or problem with which a customer is dealing. The multi-criteria decision making (MCDM) method deals with multi attributes dealing with a complex decision hierarchy. In order to extend single decision making procedures (choice) to dealing with multiple qualities of decision makings, different methods by different authors have been proposed; which include Analytic Hierarchy Process (AHP) (Saaty, 1980), ELECTRE PROMETHEE (Vincke, 1992), Multi-attribute utility theory (Vetschera, 1991) and others (Beauchamp-Aktova, 2007).

Multi-criteria decision making (MCDM) approaches are major parts of decision theory and analysis. They seek to take explicit account of more than one criterion in supporting the decision process (Al-Harbi, 2001). According to Beauchamp-Aktova (2007) the applications of these methods which confirm the advantages of decision-making using MCDM amongst others are:

1. Provides a flexible way of dealing with qualitative multidimensional effects of decision, even in the absence of monetary information (Fabbri, 1998).
2. Improves the decision process as each participant understands the benefits and losses.
3. Different interest groups may learn the meaning of the criteria and goals and objectives of different stakeholders.
4. Most conflicts between objectives are resolved.
5. The MCDM method provides a ‘conscience in search of meaning’.

MCDM is a structured framework for analysing decision problems characterised by complex objectives (Nijkamp *et al*., 1990, Zeleny, 1982). MCDM can also deal with long term time horizons, uncertainties, risks and complex value issues. The MCDM process typically defines objectives, chooses the criteria to measure the objectives, specifies alternatives, transforms the criterion scales into commensurable units, assigns weights to the criteria that reflect their relative importance, and selects and applies a mathematical algorithm for ranking alternatives and chooses an alternative (Howard, 1991; Keeney & McDaniels, 1992; Hajkowicz & Prato, 1998; Massam, 1998).The process begins when the decision maker perceives the need to cater the course of the system, which may involve a set of goals about which he is concerned. The situation is then diagnosed and the general statements of the overall needs or objectives are stated.

Keeney and Raiffa (1976) give an excellent account of the meaning, structure and properties of the terms objectives and attributes in multi-criteria decision making. An objective is a statement about the desired state of the system under consideration towards which the decision maker strives. Thus, in a multi objective decision problem, there are several statements expressing the decision maker's desired state of the system. Descriptions of human decision making are replete with interchangeable terms, the lack of a standard terminology, and have few widely accepted definitions. Decision 'criteria' are also referred to as yardsticks, measures of effectiveness, standards, rules, principles, and even models. Decision makers pursue and strive for 'goals' which may also mean targets, aims, objectives, purposes and intents. They also describe and classify the objects of reality in terms of their characteristics or 'attributes'. In considering or carrying out pursuits, decision makers contemplate different options, strategies or 'alternatives'. Zeleny (1982)

also gave an account of the terms used in decision making. *Attributes* refers to descriptors of objective reality. They may be actual objective traits, or they may be subjectively assigned traits but they are perceived as characteristics of objects in the outside world. *Objectives* are closely identifiable with a decision maker's needs and desires; they represent directions of improvement or preference along individual attributes or complexes of attributes. There are only two directions: more and less, i.e., maximise and minimise. Objectives also represent directions of preference along individual attributes or complexes of attributes. *Goals* are fully identifiable with a decision maker's needs and desires. They are a priori determined, specific values or levels defined in terms of either attributes or objectives. *Criteria* are measures, rules and standards that guide decision making.

Zeleny (1982) further added that since decision making is conducted by selecting or formulating different attributes, objectives or goals, all three categories can be referred to as criteria. That is, criteria are all those attributes, objectives or goals which have been judged relevant in a given decision situation by a particular decision maker. Thus the term MCDM indicates a concern with the general class of problems that involve multi attributes, objectives and goals. Well defined objectives often exhibit a hierarchical structure. An objective is operational if there is a practical way to assess the level of achieving such an objective. To facilitate the practical method, a set of attributes is assigned to each objective at the lowest level. An attribute is a measurable quantity whose (measured) value reflects the degree of achievement for a particular objective (to which the attribute is ascribed). To assign an attribute (or a set of attributes) to a given objectives, two properties should be satisfied: comprehensiveness and measurability. An attribute is comprehensive if its value is sufficiently indicative of the degree to which the objective is met. It is measurable if it is

reasonably practical to assign a value in some scale to the attribute for a given alternative. The set of attribute should possess some desirable properties. Keeney and Raifa (1976) list five such properties which are as follows: complete, operational, decomposable, non redundant and minimal.

According to Keeney and Raifa (1976), in searching for a suitable method for solving a certain multiobjective decision problem, the type of decision situation that is most appropriate for that problem must be identified. For example, in buying a house, where choices (houses) are explicit, and the attributes (such as cost, location from work, neighbourhood) are well known, multiobjectives techniques that concentrate on measuring the decision maker's preference, such as multiattribute utility function approach, should prove advantageous. While the nature of the decision situation determines the suitable multiobjective methodology, there is no formal guideline for choosing an appropriate decision situation for a particular decision problem. The design situation depends on the nature of the problem and on the experience, ingenuity and judgement of all concerned.

When confronted with a multi-criteria problem, some simple methods which may be used to reduce mental efforts (Chen & Hwang, 1991) include:

Dominance – An alternative is dominated if there is another alternative, which excels in one or more criteria and equals it in the remaining criteria. By first comparing two alternatives and discarding the dominated one, then comparing the undiscarded alternative with the next one and repeating the same procedure until all alternatives have been considered, the non dominated set of alternatives is determined.

Conjunctive method – An alternative which does not meet the minimal acceptable level for all criteria is rejected. This method may be used in establishing an approved list of materials that are needed to fulfil a set of minimum requirements.

Disjunctive method – A desirable set for each criterion is used to select alternatives, which equal or exceed those levels in any criterion. An alternative is acceptable if it meets any one criterion.

Lexicographic method - Criteria are ranked in the order of importance. Alternatives are compared with respect to the most important criterion. The one with highest value on the criterion is selected. If there are several alternatives with the highest value, they are compared with respect to the next most important criterion. The procedure is repeated until one alternative is left or until all criteria have been considered.

4.4 THE NEED FOR DECISION-MAKING PREFERENCE MEASUREMENT TOOL

Given the many attributes that are available for preference selection by tenants at office buildings in Kuala Lumpur city centre, there is a need for a development of a tenant decision making framework to enable the measurement of the preferences by the respective tenant organisations. The use of decision making preference tool/aid will help to measure the decision makers' preference as it helps to overcome their limited cognitive capacity by providing consistent and structured frameworks in enabling comparison of the decision options (Boudreau, 1989). Timmermans and Vlek (1992) found that decisions tools/aids help human beings to overcome their shortcomings in judgement and limited short-term memory that prevent them from processing large amounts of information and solving complex problems. Decision tools/aids enable individuals to use more attributes during

evaluation, conduct more thorough decision processing, and let the decision tool/aid influence their preference formation, compared to the unaided condition. Decision tools/aids also facilitate task-related learning because they contain task knowledge components, which can enhance expertise development (Libby & Luft, 1993).

The purpose of the Tenant Office Space (TOS) Preference framework is to 'apply a sequence of transparent steps'; to provide such clarity of insight into the office space selection problem that the decision maker will undertake. There are several advantages of developing such a framework or model. McCoy and Levary (1988) suggested that a model shortens the knowledge acquisition process of non-experts because it has already acquired the human expert's knowledge and transferred it into a useable form. In addition, Kometa *et al*. (1996) also suggested that a model allows decision-making to be more systematic and attention can be paid to weaknesses of the alternatives that are identified by the model. A database can also be built. Poor performing alternatives can be immediately identified. Factors which might otherwise not be considered would be highlighted in a model (Flanagan & Norman, 1993).

Notwithstanding their advantages, Glover *et al*. (1997) discovered that the use of decision tools/aids might cause inexperienced users to approach decision-making mechanistically without becoming actively involved in the task or judgement. This causes the acquisition of task-related knowledge to be reduced and produces inappropriate reliance on the decision tool/aid.

4.5 TECHNIQUES AVAILABLE FOR MULTI-CRITERIA DECISION MAKING (MCDM)

Kauko (2007) mentioned that the multi-criteria decision making techniques are based on multi-attribute value theory, and involve operational considerations as well (e.g., Miettinen & Hamalaine, 1997). These perspectives' approaches have been developed, inter alia, as aids to decision making in complex situations. There are many decision-making techniques available. One way is to classify decisions according to the data they use. Firstly, there are deterministic, stochastic or fuzzy MCDM methods and there could be situations that involve combinations of all of the above. Secondly, MCDM methods can be classified according to the number of decision makers involved in the decision process. Hence, there can be a single decision maker or a group of decision makers (Triantaphyllou, 2000). Hajkowicz *et al*. (2000) classify MCDM methods under two major groupings, namely continuous and discrete methods, based on the nature of the alternatives to be evaluated (Janssen, 1992). Continuous methods aim to identify an optimal quantity, which can vary indefinitely in a decision problem. Techniques such as linear programming, goal programming and aspiration-based models are considered continuous. Discrete MCDM methods can be defined as decision support techniques that have a finite number of alternatives, a set of objectives and criteria by which the alternatives are to be judged and a method of ranking alternatives, based on how well they satisfy the objectives and criteria (Hajkowicz *et al*., 2000). Discrete methods can be further subdivided into weighting methods and ranking methods (Nijkamp *et al*., 1990). These categories can be further subdivided into qualitative, quantitative and mixed methods. Qualitative methods use only ordinal performance measures. Mixed qualitative and quantitative methods apply different

decision rules based on the type of data available. Quantitative methods require all data to be expressed in cardinal or ratio measurements (Hajkowicz *et al*., 2000).

Chen and Hwang (1991) have also classified MCDM methods according to the type of information and the salient features of the information. A taxonomy of a number of MCDM methods according to Chen and Hwang (1991) is given in Figure 4.1.

The major classes of methods of the comparison made by Cheng and Hwang (1991) have identified the following differences:

1) Methods for which no preference information is given.
2) Methods for which information on the attributes are given; the salient features of the information are compared as follows:
   - Standard Level
   - Ordinal
   - Cardinal

The methods under the two (2) major comparisons are discussed below.

1) Methods for which no preference information is given.

The choices of alternatives can be based on broad principles without rigorous evaluation since the decision maker has no preference. The major classes of methods are:

- Dominance - the number of alternatives is reduced by comparing pair of alternatives. An alternative will be eliminated if the other alternative exceeds it in one or more attributes and equals it in the remainder.

- Maximin - the overall performance of an alternative is determined by the weakest or poorest attribute. A decision maker will examine the attribute values of each alternative, take cognisance of the lowest value of each alternative and then select the alternative with the most acceptable value in its lowest attribute.
- Maximax – the decision maker selects an alternative by its best attribute value rather than its worst value.

2) *Methods for which information on the attributes are given*

Under the various salient feature of information the various methods are:

- Standard Level – Conjunctive Method (Satisficing Method) & Disjunctive Methods

  In the conjunctive method, an alternative which does not meet the minimal acceptable level for all criteria is rejected. This method may be used in establishing an approved list of materials that are needed to fulfil a set of minimum requirements. This method has strong intuitive appeal and is particularly suitable for dichotomising alternatives into acceptable/not acceptable categories. This method do not require that the attribute information be in numerical form On the other hand, disjunctive method has a desirable set for each criterion to be used to select alternatives, which equal or exceed those levels in any criterion. An alternative is acceptable if it meets any one criterion. Both methods ignore information on the relative importance of the attributes.

- Ordinal (relative importance among attributes determined by ordinal preference is required) – Elimination by Aspect & Lexicographic Method

  In elimination by aspect, there are minimum cutoffs for each attribute and these attributes are ranked. Each of the alternatives is compared with respect to an attribute and is eliminated if it cannot pass the cutoff. The process continues to compare alternatives against the next attribute until all alternatives except one have been eliminated. The method is relatively easy to apply but it may lead to the elimination of alternatives that are better than those which are retained. In lexicographic method, the criteria are ranked in the order of importance by the decision maker. Alternatives are compared with respect to the most important criteria. The one with highest value on the criteria is then selected. If there are several alternatives with the highest value, they are compared with respect to the next most important criteria. The procedure is repeated until one alternative is left or until all criteria have been considered.

- Cardinal (decision maker's cardinal preferences of attributes is required) – Weighted Sum Model (WSM), Weighted Product Method (WPM), Analytic Hierarchy Process (AHP), ELECTRE, TOPSIS

  WSM and WPM are the most commonly used methods in single dimensional problems. WSM is based on the additive utility assumption which is the total value of each alternative is equal to the sum of the relative

weights of each criteria. It is applicable only when all the data are expressed in exactly the same unit. WPM is similar to WSM. The main difference is that it has multiplication instead of addition in the main mathematical operation. A finite set of decision alternatives is described in terms of a number of decision criteria. Each decision alternative is compared with the others by multiplying a number of ratios, one for each decision criteria. Each ratio is raised to the power equivalent to the relative weight of the corresponding criteria.

The ELECTRE method (ELimination Et Choix Traduisant la REalité or ELimination and Choice Expressing REality) uses the concept of 'outranking relationship'. It consists of pairwise comparison of alternatives based on the degree to which evaluation of alternatives and the preference weights confirms or contradicts the dominance relationship between alternatives. ELECTRE application has two parts: first, the construction of one or several outranking relations, which aims at comparing in a comprehensive way each pair of actions; second, an exploitation procedure that elaborates on the recommendations obtained in the first phase. The weak point in ELECTRE method is that it sometimes unable to identify the most preferred alternative and only produces a core of leading alternatives. This method is especially convenient when there are decisions problems that involve a few criteria with a large number of alternatives (Lootsma & Schuijt, 1990).

TOPSIS (for the Technique for Order Preference by Similarity to Ideal Solution) is a variant of the ELECTRE method. The basic concept of this method is that the selected alternative should have the shortest distance from the ideal solution and the farthest distance from the negative-ideal solution. TOPSIS takes the cardinal preference information on attributes and a set of weights is required. One of the assumptions of TOPSIS is that each attribute takes either monotonically increasing or decreasing utility.

AHP is useful when the decision problem has large number of attributes as it is easier to assess the set of weights using a hierarchical structure of objectives. The AHP is used to assess weights for the criteria preference in office selection in this study.

Having compared the major classes of methods under the various salient features of the information from the decision maker, the following observations can be made. The method under which no preference information is given suffers from the shortcoming of inadequate utilisation of the available information and is considered unsuitable for use in this research. The methods in which information on attributes are given is relevant to this study. Since the conjunctive and disjunctive methods ignore information on the relative importance of the attributes, they are unsuitable for this research. Elimination by Aspect & Lexicographic Methods are unsuitable as ordinal preferences only are evaluated. WSM and WPM are also not suitable as these methods provide a finite set of decision alternatives which is described in terms of a number of decision criteria.

This study does not compare alternative office buildings; instead it attempts to derive the relative importance of criteria for office space selection at the top grade buildings in Kuala Lumpur city centre. The result of the ELECTRE method is not suitable as it shows the set of ranks instead of cardinal information (Lootsma & Schuijt, 1997). Since the impact of rank reversal in the TOPSIS method is serious (Buede & Maxwell, 1995), the AHP is a better method when there is cardinal preference and a set of relative weights. AHP is a simple pairwise comparison procedure that gives a fast and accurate evaluation of MCDM problems with a large number of attributes/criteria in a hierarchical structure. The methods that require the normalisation of the alternatives are not considered for this study, as the derivation of the weights of the attributes for the office selection in accordance to the tenants' preference is the main task in the development of the TOS preference framework. Thus the AHP procedure is chosen to evaluate the relative importance of the areas and factors for the development of the Tenant Office Space (TOS) framework.

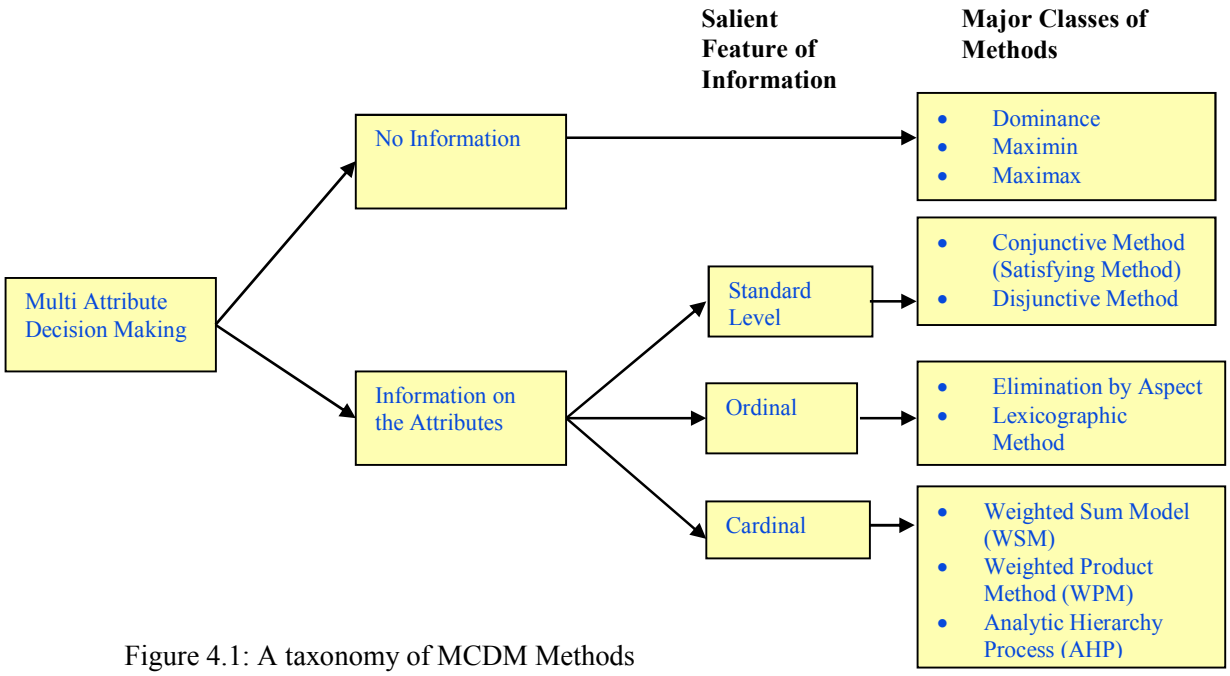


Figure 4.1: A taxonomy of MCDM Methods
Source: (Chen & Hwang, 1991)

4.6 ANALYTIC HIERARCHY PROCESS (AHP)

The analytic hierarchy process was pioneered and refined by Saaty (1980, 1994). It aims to quantify relative priorities for a given set of alternatives on a ratio scale, based on the judgement of the decision maker, and stresses the importance of the intuitive judgements of a decision maker as well as the consistency of the comparisons of the alternatives in the decision making process (Saaty, 1980). It employs a complete and hierarchical set of attributes for evaluating alternatives. In this technique, the problem is decomposed into a hierarchy to include all attributes. The three main principles used in AHP (Saaty, 1986; Forman & Selly, 2000; Forman & Gass, 2001) are:

(i) decomposition of a complex multi-criteria problem into a structure;

(ii) comparative judgements of alternatives using criteria within the structure; and

(iii) synthesis of the judgements to arrive at overall priorities, preferences or preferred actions.

The underlying principle is based on making pair-wise comparisons on a nine-point scale (see Table 4.1).

Table 4.1: 9-Point Scale Intensity of Relative Important Scale

Intensity of definition	Importance	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Weak Importance of one over another	Experience and judgement slightly favour one activity over another
5	Essential or strong Importance	Experience and judgement strongly favour one activity over another
7	Demonstrated Importance	An activity is strongly favoured and its dominance is demonstrated in practice
9	Absolute Importance	The evidence favouring one activity over another is one of the highest possible order of affirmation
2, 4, 6, 8 Judgements	Intermediate values between judgements	When compromise is needed the two adjacent judgements

Reciprocals of the above Non Zero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i

(Source: Saaty, 1980)

On eliciting weights, pair-wise comparisons of attributes are made using the nine-point scale as shown above. After all the values have been entered, the maximum eigen-value and its associated normalised eigen-vector are calculated. This eigen-vector represents the best weighting for the attributes. The normalised weights of all hierarchy levels are combined to determine the unique normalised weights corresponding to the last level. The pair-wise comparisons are then manipulated through eigen-vector calculations to create a ratio value scale that is normalised to sum to 1.0.

This method decomposes a complex MCDM problem into a system of hierarchies (Saaty, 1990). The decision problem is represented as a hierarchy in which the top vertex is the main objective of the problem, the bottom are the actions, and the intermediary vertices represent the criteria. At each level of the hierarchy, a pair-wise comparison of the vertices is performed from the point of view of their contribution to each of the higher vertices to which they are linked. The pair-wise comparison is made in terms of preference/importance ratios evaluated on a numerical scale proposed within the method. The final step in the AHP deals with the structure of an m x n matrix (where m is the number of alternatives and n is the number of criteria). A mathematical technique based upon the computation of the eigen-values of the matrix of pair-wise comparisons is adopted. The elements of the eigen-vector are normalized to add to 1, and the elements used as weights. The pair-wise matrix can be shown as follows:

$$A = [a_{ij}] = \begin{array}{c} \\ C \\ C \\ C \end{array} \begin{array}{c} \begin{array}{ccccc} C_1 & & C_2 & & C_n \end{array} \\ \begin{bmatrix} 1 & a12 & \cdots & a1n \\ \vdots & : & & \vdots \\ \frac{1}{a12} & 1 & \cdots & a2n \\ \vdots & : & & : \\ \vdots & : & & : \\ \frac{1}{a1n} & \frac{1}{a2n} & & 1 \end{bmatrix} \end{array}$$

$\sum_{i=1}^{n} a_{ij} = A$ ..... *the sum is equal to one*

The computation of the weights in AHP involves two steps. First, the pair-wise comparison matrix $A=[\alpha_{ij}]_{mxn}$ is normalized by Equation (1) and then the weights are computed by Equation (2).

$$a_{ij} = a_{ij} \qquad (1)$$

$$\sum_{i=1}^{n} a_{ij}$$

for all j = 1,2,…..,n

$$w_i = \frac{\sum_{i=1}^{n} a_{ij}}{n} \qquad (2)$$

for all i = 1,2,……n

Saaty (1980) showed that there is a relationship between the vector weights, w and the pair-wise comparison matrix, A, as shown in Eq 3.

$$A_w = \lambda_{max} \qquad (3)$$

The λ_{max}value is an important validating parameter in AHP and is used as a reference index to screen information by calculating the Consistency Ratio (CR) of the estimated

vector. To calculate the CR, the Consistency Index (CI) for each matrix of order n can be obtained from Eq 4.

$$C\ I = \frac{\lambda_{max} - n}{n-1} \quad (4)$$

Then, CR can be calculated using Eq 5

$$CR = \frac{CI}{RI} \quad (5)$$

where RI is the random consistency index obtained from a randomly generated pair-wise comparison matrix. Table 4.2 shows the value of the RI from matrices of order 1 to 10 as suggested by Saaty (1980). If CR is <0.1, then the comparison are acceptable. If, however CR ≥ 0.1, then the values of the ratio are indicative of inconsistent judgements. In such cases, the decision maker should reconsider and revise original values in the pair-wise comparison matrix A.

Table 4.2: Random Inconsistency Indices (RI) for n=10

N	RI
1	0.0
2	0.0
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.42
9	1.46
10	1.49

(Source: Saaty, 1980, Lotfi *et al*., 2009)

To illustrate the system of hierarchy used in AHP, the principles are explained in greater details as follows:

4.6.1 Decomposition

The AHP requires that the elements of a decision problem are clearly defined in a hierarchy, as illustrated in Figure 4.2 below. At the top of the hierarchy is the goal to be reached or decision to be made. The criteria that are important in reaching the goal or making the decision are identified. Often, each of these criteria can be broken down into components or sub criteria (and perhaps even sub-sub criteria). The sub criteria should be evaluated by reference to their primary or principal criteria (and not other principal criteria). It is preferable to form sub criteria than have too many primary criteria, if the criteria can be legitimately grouped as components of the primary criteria (Forman & Selly, 2000).

The criteria are the intermediate levels of the hierarchy. At the bottom of the hierarchy are displayed the alternative decisions, which may be expressed as alternative actions or outcomes. Since each of the criteria is evaluated by reference to the alternatives as well as the goal, the appropriate criteria may be partly determined by the alternatives.

The purpose of building the hierarchy is to reduce a complex problem or decision to manageable elements. The hierarchy is a framework that exhibits the forces that influence a decision and the AHP relies on knowing enough about a problem to develop a complete structure of relations and influences (Saaty, 1994).

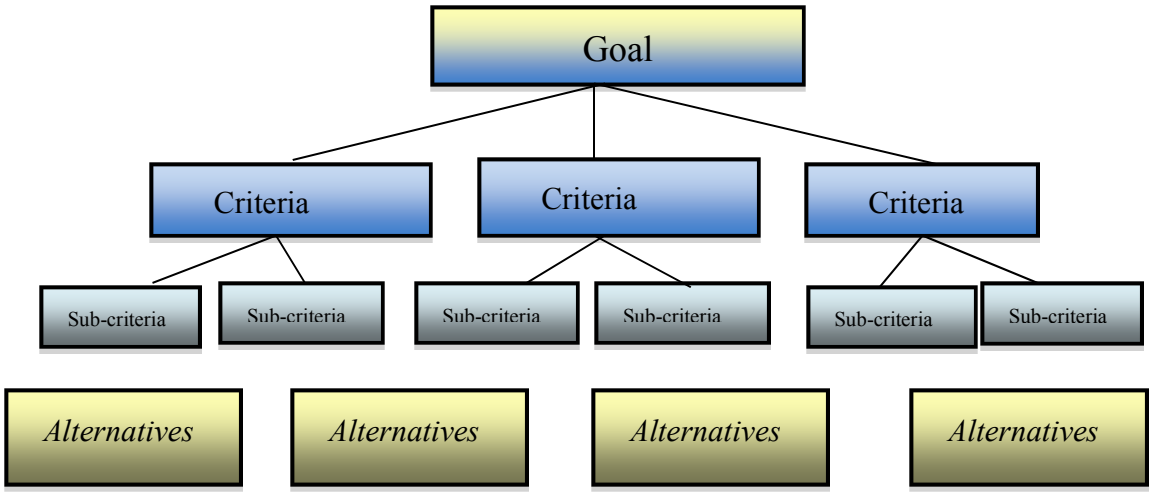


Figure 4.2: A typical hierarchy for the AHP
(Source: Saaty, 1986; Forman & Selly, 2000)

4.6.2 Comparative Judgments

Having broken down the multi-criteria problem to its elements, the AHP requires a series of pair-wise comparisons of the criteria within each group. Although this will lead to a ranking of the criteria, a key feature of the AHP is that users do not directly rank all the criteria but only compare two at a time. This is to simplify the evaluation of the criteria. Forman and Gass (2001) maintain that decision makers have been comfortable performing pair-wise comparisons in a wide variety of applications.

Depending on the nature of the decision or problem, the criteria may be compared on their relative importance, desirability or likelihood (further explanation will refer just to relative importance). The comparisons must be made on a ratio scale, rather than lower order measurement (Saaty, 1994; Forman & Gass, 2001). The scales may be mathematical (equally important, twice as important, five times as important, etc.), verbal or graphical (Saaty, 1994; Forman & Selly, 2000). Comparisons by the last two are converted to numeric scales for synthesis.

4.6.3 Synthesis of the Judgments

The results of all the pair-wise comparisons within each group of criteria or sub criteria are amalgamated to place the criteria on a ratio scale of their importance. The pair-wise ratios form a matrix of the relative importance within each group. It is assumed that the comparisons are reciprocal (if A is twice as important as B, B is half as important as A). The AHP generally uses 'the normalized eigenvector associated with the largest eigen-value of this matrix' to calculate the weight to be attached to each criteria (Forman & Gass, 2001; Saaty, 1990). The principal vector of the matrix will have weights totalling approximately one and these are normalized to total exactly one. It has been claimed that a simple averaging solution is admissible (Bender *et al*., 1998) but Saaty (2003) argued the importance of adopting his original approach, which is used by the Expert Choice™ software below. Amalgamating the pair-wise comparisons has been verified by experiment to accurately reflect the relative importance of the criteria on a ratio scale (Forman & Selly, 2000).

However, pair-wise comparisons within a group are not automatically consistent. The greater the need to normalise the weights of the principal vector, the less consistent are the pair-wise ratios. Saaty (1980) defined an Inconsistency Ratio, based on the difference between recorded weights and values from a matrix generated at random (Saaty, 1994; Forman & Selly, 2000). An Inconsistency Ratio of more than about 10 per cent would warrant further investigation into the structure of the model, or the user's expertise or interest in making the comparisons (Forman & Selly, 2000).

4.6.4 The Expert Choice™ Software

The AHP forms the basis of the decision support computer software package Expert Choice™ (Forman & Gass, 2001). The Expert Choice™ software handles multi-criteria decisions by requiring that the user first establishes a hierarchy of criteria and then makes pair-wise comparisons of the criteria at each level, rather than consider them all simultaneously (Forman & Selly, 2000). The rationale for both of these features is that they help to reduce the overall decision to simpler elements. Pair-wise comparisons may be practical for qualitative or subjective factors that would be would be more difficult to rank directly.

4.6.5 The AHP Operation

AHP consists of three main operations including hierarchy construction, priority analysis and consistency verification. First, the decision makers need to break down complex multiplex multi-criteria decision problems into their component parts, of which every possible attribute is arranged into multi hierarchical levels. Thereafter, the decision makers have to compare each cluster in the same level in a pair-wise fashion based on their own experience and knowledge. Since the comparisons are carried out through personal or subjective judgements, some degree of inconsistency may occur. To guarantee the judgements are consistent, the final operation, called consistency verification, which is regarded as one of the biggest advantages of the AHP, is incorporated in order to measure the degree of consistency among pair-wise comparisons by computing the consistency ratio (Anderson *et al*., 2005).

The overall procedure of the AHP is shown in Figure 4.3.

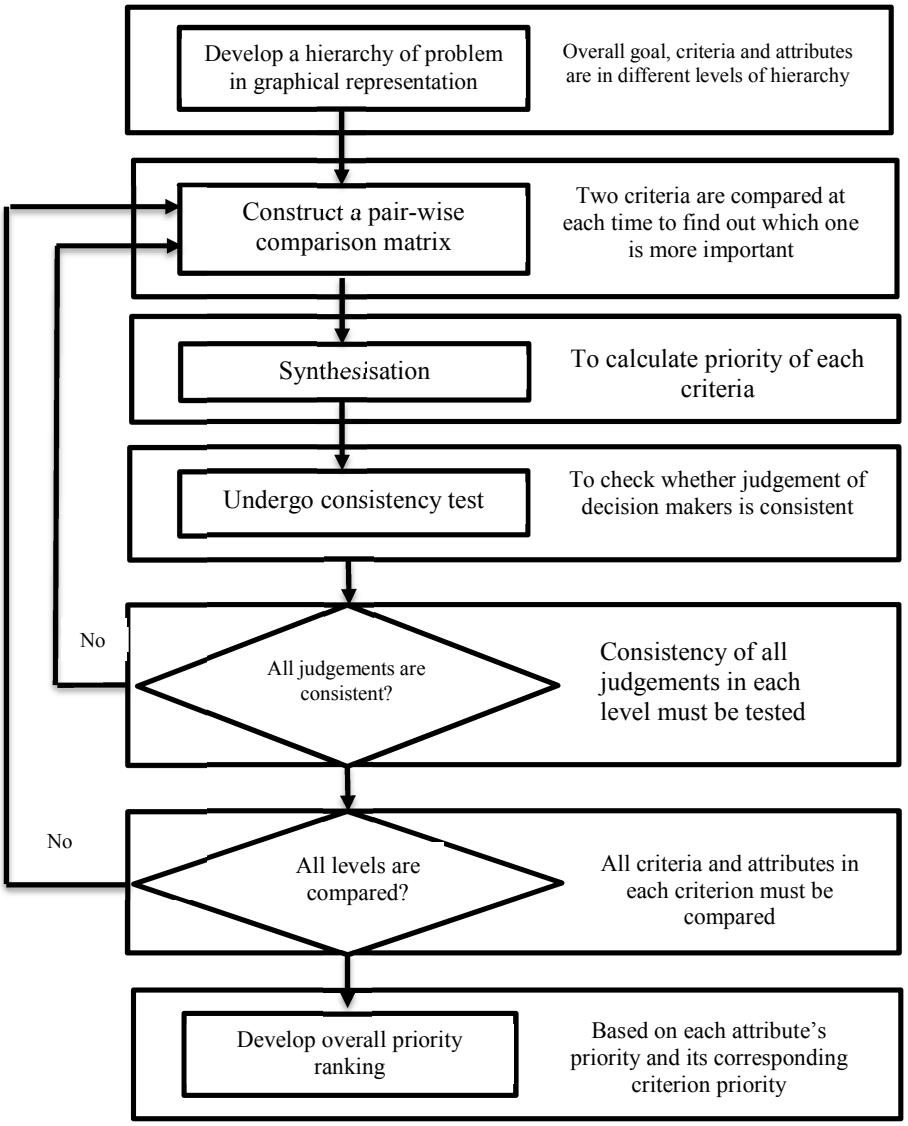


Figure 4.3: The Overall Procedure of AHP
(Source: Ho *et al*, 2006)

4.7 ADVANTAGES AND USES OF AHP

AHP is useful for a large number of attributes with outcomes acceptable to decision makers and measured on a subjective scale (Bard, 1992). It makes use of a decision maker's intuitive judgements, knowledge and experience. It is also more accessible and more conducive for consensus building. Decision makers have no difficulty furnishing the

necessary data and discussing results. Maas and Wakker (1994) found that pair-wise comparisons can be used to detect intransitivity. This technique overcomes the consistency difficulty for small problems of 15 or fewer attributes (White, 1995). It is able to cope with problems that are hard or impossible to structure by other techniques (Jabri, 1990). Another advantage of AHP is that measurement scales can be used in areas that are fuzzy, too unstructured or too political for traditional techniques (Schoemaker & Waid, 1982). AHP also organises tangible and intangible factors in a systematic way and provides a structured yet simple solution to the decision making problems (Skibniewski & Chao, 1992). In addition, by breaking a problem down in a logical fashion from the large, descending in gradual steps, to the smaller, one is able to connect, through simple paired comparison judgements, the small to the large. An overall summary of the advantages of AHP, as given by Saaty (1980) is as follows:

1) It helps to decompose a complex and unstructured real world multiple criteria decision making problem (or research problem) into a set of elements in terms of variables organized in a multi level hierarchal form that also determines the overall priorities by quantifying information providers' subjective judgements.

2) It employs a pair-wise comparison process by comparing two objects at a time to formulate a judgement as to their relative weights. As this method exhaustively compares one element with others, it can generate more useful information available to validate the results.

3) It measures the consistency level of each judgement matrix. Some researchers refer to the consistency measure as the consistency test (Cheng & Li, 2001; Leung & Cao, 2001). A study by Cheng and Li (2001) concluded that the consistency

measure is a critical component of AHP and it makes AHP more reliable and useful as decision making tool.

AHP has been applied with success, inter-alia, in regional and urban planning, site selection for building and environmental impact assessment (Bender *et al*., 1997; Nevalainen *et al*., 1990). According to Kauko (2006), one of the more classical examples of application in the area of real estate was the case for the choice for the best-alternative - problem of house buy (e.g., Ball & Srinivasan, 1994; Bender *et al*.; 1997, Schniederjans *et al*., 1995; Saaty, 2003). In this exercise for housing and residential land markets, the variables and methodological ideas are based on previous studies undertaken with the AHP.

The AHP has been used to research property decisions that involve several criteria, some of which are qualitative or subjective. These include weighing the subjective attributes of housing (Ball & Srinivasan, 1994; Fischer, 2003), the locational qualities that influence housing preferences (Kauko, 2003; Kauko, 2006), qualitative building features that attract office occupants in Sydney, Australia (Ho *et al*., 2005), environmental qualities of offices (Bender *et al*., 1998), assessing the importance of factors influencing hotel investment decision making (Newell & Seabrook, 2006) and rating the criteria influencing the stigma of land contamination (Chan, 2002). It has been observed by Kauko (2003) that the applications to property decisions were designed to judge the importance of attributes that had previously been identified.

AHP has also been extensively applied in different areas including public policy and economics amongst others (Saaty & Nezhad, 1981; Saaty & Rush, 1987) because of the ease of its use. Other applications have been found in the fields of information and management (Byun, 2001; Forgionne & Kohli, 2001) as well as in construction research (Wu *et al*., 2007, Shapira & Simcha, 2009).

As mentioned by Jabri (1990), the explosion in the number of pair-wise comparisons is a limitation of this approach. For comparisons to be kept within a reasonable total, the number of alternatives or attributes to be compared has to be limited. The number of pair-wise comparisons, which is the basis of this technique, is governed by the formula n (n-1)/2. However, there are studies that have used a large number of attributes. Islam and Abdullah (2005) summarised the list compiled by Saaty and Forman (2000) of the MCDM problems that have large numbers of attributes or criteria. A summary of selected problems that have a large number of criteria is shown in Table 4.3.

Table 4.3: Selected MCDM Problems that have a Large Number of Criteria

No	Problem	Criteria
1	Deciding which areas of land are suitable for commercial development.	30
2	Selecting a site for a shopping centre.	26
3	Determining viable solutions to the problem of homelessness.	20
4	Choosing a city to live in.	38
5	Deciding whether to bid for a contract.	20
6	Selecting the best company to acquire.	23
7	Evaluating the quality of software products.	28
8	Deciding which banks should be considered as candidates for acquisition.	19
9	Determining the best level of dam reservoir.	30
10	Should a public hospital continue operation, sell or lease its facilities to a private organisation?	20

(Source: Adapted from Islam and Abdullah, 2005)

Though the number of criteria shown is large, the use of the Expert Choice™ software has assisted in the computation of the eigen-value and the determination of consistency of the pair-wise comparison across the levels of the hierarchy of the problem.

4.7.1 Use of AHP for Office Preference Measurement

The tenants' preferences for office space reflect the preferences of the consumers for a product. It is known that several methods exist in theory and practice to survey consumer preferences, and the most common technique in marketing is conjoint analysis. However, recent studies by Koo and Koo (2010) and Helm *et al*. (2008) have found other tools to be also applicable, which include Analytic Hierarchy Process (AHP). As discussed earlier in Section 3.9, studies have shown the advantages of AHP over CA, and the most significant advantage is that CA is a better choice in relatively simple decision problems, whereas AHP is a better method in more complex problems (Helm *et al*., 2004). Thus, in the development of the TOS framework to measure tenants' office preference, AHP has been chosen to assist in evaluating the preferences of the main tenants' sectors and to indicate the set of criteria for each sector from the list of factors that have been identified in Section 3.7.

4.8 SUMMARY

In this chapter, various methods of multi-criteria decision-making (MCDM) methods were discussed. Of these methods, AHP provides several advantages as it is useful for a large number of attributes with outcomes acceptable to decision makers and measured on a subjective scale (Bard, 1992). It makes use of a decision maker's intuitive judgements,

knowledge and experience. It is also more accessible and more conducive for consensus building. It also organises tangible and intangible factors in a systematic way and provides a structured yet simple solution to the decision making problem (Skibniewski & Chao (1982)). Having compared AHP with the other MCDM methods, AHP is the most suitable method to be used in constructing the Tenant Office Space (TOS) Framework. The AHP shall be used to weight and rank the factors selected by the main tenants' sectors. These weighted factors shall form the specific tenants' criteria in developing the TOS assessment tool. This tool shall comprise the measurements of the identified factors under the four (4) main areas (as in Section 3.7); forming the specific description of the office space and the relative weights that each tenant sector has assigned for these factors. The use of AHP aids the identification of the relative weights and ranks for each of the factors that the tenants prefer. The development of this tool shall form the TOS framework which shall serve as an assessment tool to gauge the suitability of available office space for the different sectors of tenants.

CHAPTER 5

RESEARCH METHODOLOGY

5.1 INTRODUCTION

This chapter addresses the research methodology in achieving the objectives of the study through a systematic, empirical and critical investigation of the issues (Kerlinger & Lee, 2000) explained in Chapter 1. The methodology involves several stages of data collection involving a Delphi method, Principal Component Analysis and Analytic Hierarchy Process (AHP) methods through questionnaire surveys towards the development of the TOS framework. A research can be described as a systematic and organised effort to investigate an area-specific problem that needs a solution (Sekaran, 2006)

According to Chaudhary (1991), the differences between research methods and research methodology are; research methods describe all techniques or methods that are used to conduct a research, while research methodology is a systematic way of solving problems or a science of studies on how to carry out research scientifically. In addition, research methodology has many dimensions and research methods are only some integral parts of it (Chaudhary, 1991; Kumar, 2005). Sarantakos (1998) classified research methodology into quantitative and qualitative aspects while 'mixed method' contain elements of the quantitative and qualitative approaches (Creswell, 2003). According to Naoum (1998) quantitative survey produces non-abstract and trustable data. It can be measured by numbers and analysed by statistical procedures.

This research adopts the quantitative approach to develop the TOS framework. A preliminary study was performed prior to the main study. The preliminary study (Part I) involves a Delphi Method to uncover the important and relevant office occupation factors in the Kuala Lumpur office market from the viewpoints of the experts who comprise the property owners, managers and property consultants. As Skulmoski *et al*. (2007) has observed that the Delphi method is typically used as a quantitative technique (Rowe & Wright, 1999; Rowe *et al*., 2005; Friend, 2001; Shook, 1994; Whittinghill, 2000), this study uses the descriptive statistics to analyse the feedback from the experts.

The second part of the research, i.e., the main study is the quantitative approach, having sub-sections on sampling, design of questionnaire, instruments, data collection procedure, and method of analysis. The Analytic Hierarchy Process (AHP) tree is also constructed for the determination of the structure of MCDM technique used for the development of the TOS framework. As discussed in Section 4.5, and following Helm *et.al*. (2008), AHP is used in this research to develop a Tenant Office Space (TOS) framework (see details of the AHP method in Section 4.6). In this study, the decision maker undertaking the task of decision making is the person responsible for tenant organisations' office decisions. The design in undertaking this study is outlined in Section 5.2. The factors for office occupation by tenants are first confirmed in a preliminary study, as mentioned in Section 5.3.1. Section 5.3.2 provides a brief of the classification of the tenant sectors in the study area and how they are identified. In Section 5.3.3.1, the pilot test to finalise the questionnaire is discussed. The methods used in the main study are discussed in Section 5.3.3. Two (2) phases of analysis are used in deriving the relative importance of the factors influencing tenant office occupation: firstly, the methods of factor reduction are discussed;

and secondly, the AHP process for the determination of relative weights is discussed. Section 5.3.4 discusses the assessment of the validity and reliability of the instruments used. Section 5.3.5 describes the development of the TOS framework; and the validation of the framework is described in Section 5.3.6. Section 5.4 provides the summary.

5.2 RESEARCH DESIGN

The outlined objectives and research questions are answered through the blue print known as research design (Cooper & Schindler, 2008; Cavana *et al*., 2001). According to Chaudhary (1991) a research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose. Furthermore, Kumar (2005) stated that a research design is a procedural plan that is adopted by researchers to answer questions objectively, accurately, economically and validly. A traditional research design is a detailed plan on how a research study is to be completed: operating variables for measurement, selecting a sample, collecting data and analysing results of interest to study and for testing the hypotheses (Tyher, 1993). Bryman and Bell (2003) stressed that research design should provide the overall structure and orientation of an investigation as well as a framework within which data can be collected and analysed.

Miller and Lessard (2001) provide detailed descriptions of what are essential considerations in designing the research project. Based on their recommendations, the components of this research design would encompass the following:

- The research problem and question(s);
- Sampling procedures; and

- Methods of data collection.

In conclusion, Rani (2004) describes a research design as a blueprint or a plan for action, specifying the methods and procedures for collecting and analysing the needed information, for fulfilling the research objectives and finding the solutions.

The research design process of this study is adapted and modified from the design processes used by Ling (1998) in the development of a multi attribute model for evaluation and selection of consultants for design-and-build projects in Singapore. This research design process is as shown in Figure 5.1.

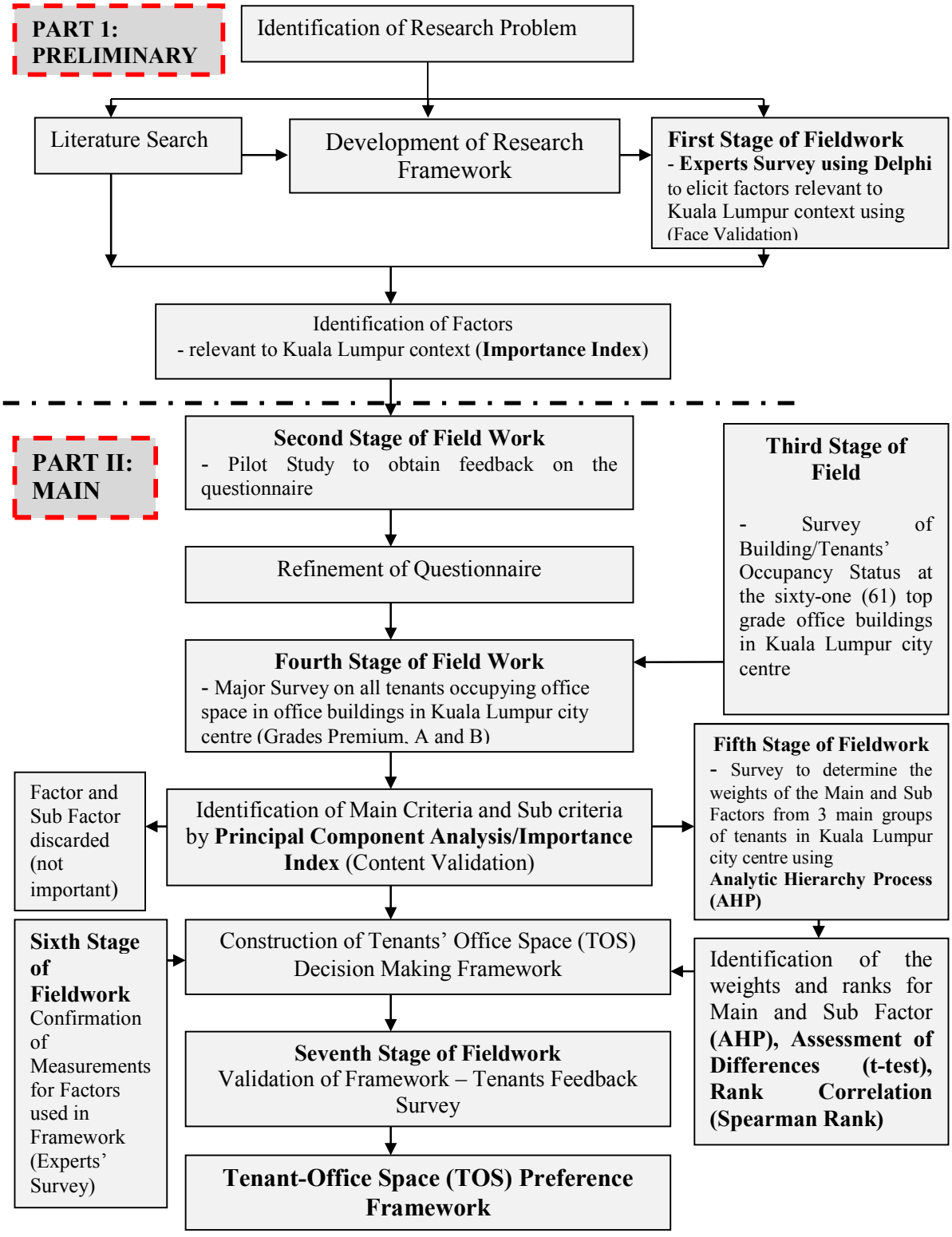


Figure 5.1: Research Design Process
(Source: Adapted from Ling, 1998)

The study adopts a quantitative approach to address the factors considered by tenants in the selection of office space at purpose-built office buildings in Kuala Lumpur city centre. The first part, which is the preliminary study, aims to develop a reference framework for establishing factors that influence the general office occupation decision making in Kuala Lumpur city centre. In this part, the research draws upon existing literature to generate a list of factors that relate to the general office occupation decision. The list is then subjected to a screening procedure to extract out the more important factors. This is done during the first stage of the fieldwork which involves the use of Delphi Technique to identify factors relevant to the local (Kuala Lumpur) context. The aim is to confirm the factors accounted for by the property agents/managers but which the literature review has failed to discern. At this stage, the factors that are relevant to tenant office space selection in Kuala Lumpur are identified. Thereafter a questionnaire comprising the relevant main factors and sub factors is developed.

The second part constitutes the main component of the research. In this part, the research sources the data directly from tenants in order to establish the factors (as well as their relative importance) that influence tenant office occupation decision making, leading to the development of a tenant office space preference framework. A series of fieldworks are undertaken to collect the necessary data. The second fieldwork in the research is a pilot survey aimed at pre-testing the questionnaire. It is to be carried out through personal interviews with selected tenants who have experience leasing office space. These tenants are selected based on convenience sampling. The way the survey is performed is to request the tenants to verify whether or not the questionnaire contains all the criteria that they regard as important in the selection of an office space. The pilot study is also to gauge the

likelihood of the questionnaire passing the test on the actual run. Feedback is also sought on the relevance, accuracy, planning, sequencing and layout of the questionnaire.

After the pilot study, the operationalised attributes are revised and the questionnaire refined. Thereafter, the Third Stage of the field work involves concurrent surveys on building and tenant occupancy at the selected sixty one (61) office buildings in Kuala Lumpur city centre. Having compiled the relevant data and contact information for the tenants, the Fourth Stage of field work, which is the main stage, is mounted to gather the important factors/attributes identified in office space selection (see Chapter 6). The data collection is by questionnaire. The identification of important factors is drawn from the tenants survey involving the population of the tenants from sixty (61) top grade office buildings in Kuala Lumpur city centre. Efforts are to be made to ensure that the questions do not contain loaded words and are phrased to avoid ambiguity. After the questionnaires are returned, they are coded into the computer, using SPSS. Four (4) main areas and sixty (60) factors undergo further empirical investigation involving principal component analysis and importance index. Statistical tests are used to the attributes that are indeed important for office space selection or reject the unimportant ones. The outcomes of both the principal component analysis and the importance index are compared. The attributes/factors that are found to be important are used in constructing the model. During the actual run, on the basis of a total of one hundred and seventy nine (179) valid responses worked with, the number of factors was reduced to twenty six (26). They were placed under the four (4) main areas.

The Fifth Stage of the field work is a survey to obtain views on the importance of the attributes in pair-wise comparison. Hence, these factors which influence office occupation decision making by tenants are subjected to the Multi-criteria Decision Making tool, i.e., Analytic Hierarchy Process (AHP), to develop the initial framework of decision making. The matrix of office space suitability is further established from the weighted factors through AHP, which is argued to possess qualitative (decision model development) and quantitative (decision model analysis) components. The MCDM framework through AHP is a hierarchic decision problem framework which consists of multiple layers specifying unidirectional relationships.

The design for the AHP method is based on a structured survey of three major sectors of tenants currently occupying the office buildings in CBD, Kuala Lumpur. The AHP is used to calculate the important weights of the factors identified by the three main tenant groups. The data collection method used was through questionnaire. The number of respondents is based on quota sampling (see section 5.3.3), so that the different categories of tenants are proportionately represented in the sample. The actual respondents (twenty-eight) were chosen based on simple random sampling. The findings of the AHP survey are then compared between groups. Through the Sixth Stage of field work, confirmation of the measures for the identified factors is made with the tenants' experts. The measurement is derived from those that are developed in an earlier study to classify office buildings in Malaysia (Mohd *et al*., 2010; Daud *et al*., 2011; Adnan *et al*., 2009). By combining the results of the weighted factors and the identified measures, a framework constituting an office tenant preference matrix is developed.

To validate the model, the Seventh Stage of fieldwork is to be carried out by asking tenants in the three main categories who are not previously involved in the initial survey to validate the findings. These tenants are asked the relative importance of the chosen criteria and also to select the suitable office buildings for their organisations if the space is available to them. The results are compared with the results of the framework that is developed earlier. The weight and office selection obtained from the tenants' evaluation and the model are analysed. After the validation exercise, the Tenant Office Space (TOS) framework is refined and finalised.

5.3 RESEARCH PROCESS

The description of the stages of the research design is shown in Table 5.1. It is the two part approach towards the development of the TOS framework. In using AHP to measure a consumer preference study, Helm *et al*. (2008) had initially conducted an elicitation approach from experts to gather the factors that are relevant before proceeding with the AHP operations. Koo and Koo (2010) had mentioned that ensuring the relevance of factors is essential in the AHP procedure. For this research, the preliminary is the initial study followed by the main stage in the form of Principal Component Analysis, Importance Index and AHP methods. In Table 5.1 below, the different phases of data collection are incorporated with literature reviews/ research questions to be answered, research methods and purposes.

Table 5.1: The Approach to this Study

Stage	Research Questions	Approach for Analysis			Purpose
		Methods/ Activities	Instruments	Tools/ Technique for Analysis	
Part I: Preli-minary	**RQ 1:** What theories and concepts of consumer decision making underpin tenant office space decision making?	**Literature Review**		Desk Study	• Identify consumer decision making concepts and office occupation factors • Develop conceptual framework
	RQ 2: What factors influence office occupation decisions at purpose built office buildings generally in Kuala Lumpur city centre?	**Delphi Method/ Experts Survey**	Questionnaire Survey I	Importance Index	• Establish Relevant Factors for office occupation in Kuala Lumpur city centre by Experts
Part II: Main **Phase 1**	**RQ 3:** What factors influence office occupation decisions by tenants at purpose built office buildings in Kuala Lumpur city centre?	**Office Buildings/ Tenants Occupan-cy Survey**	Questionnaire survey II		• Establish the Occupancy Status and contact addresses of Tenants at all buildings selected in study
		Pilot Test	Questionnaire survey III		• Establish appropriateness of instrument
		Tenants Survey	Questionnaire survey IV	Principal Component Analysis & Important Index Cronbach Alpha	• Identify Important Factors/Criteria by Tenants in Study Area through Factor Reduction & Ranking of Importance • Internal Reliability
Phase 2	**RQ 4:** What are the factors' relative importance which influence the office tenants' occupation decision at Kuala Lumpur city centre that portray the preferences of the main sectors at purpose built office buildings?	**Analytic Hierarchy Process**	Structure Interview/Survey for AHP	AHP operation	• Establish the hierarchy for the Factors • Determine Relative Weights and Ranks of Factors
				ANOVA and paired t test	• Test whether there is significant difference in the mean of the relative weights score of the tenants sectors
	RQ 5: What is the multi-criteria decision making framework which will eventually assist in the formation of an assessment tool for available office space at purpose built office buildings in Kuala Lumpur city centre?			Spearmann Rank Correlation	• Establish the correlations between the ranks
		Construc-tion of Frame work	Experts Survey		• Confirm Factors' Measurement
			Tenants Validation Survey		• Validate Assessment Matrix with the Tenants' Preference

5.3.1 Part I - Preliminary Study

As also explained earlier in Section 5.2.1, this preliminary study seeks to assemble all office occupation decision factors that are likely to be applicable locally, particularly to Kuala Lumpur. The purpose of a preliminary study is to elicit the factors that influence office occupation decisions within the specific context of Kuala Lumpur. To do this, factors identified from the literature are subjected to experts review through a Delphi procedure. The experts are those who have been involved in office occupation activities serving the tenants at top grade office buildings in Kuala Lumpur city centre. This part of the study serves as the pre-requisite to the main study which will focus directly on the perspectives of the subject of the research – the tenants – in relation to tenant office occupation decision-making.

A description of the Delphi Approach now follows.

5.3.1.1 The Delphi Approach

The Delphi approach is an iterative process used to collect and distil the judgments of experts using a series of questionnaires interspersed with feedback. The Delphi method has its origins in the American business community, and has since been widely accepted throughout the world in many industry sectors including healthcare, defence, business, education, information technology, transportation and engineering (Skulmoski *et al*., 2007). Delphi has found its way into industry, government, and finally, academia. It has simultaneously expanded beyond technological forecasting (Fowles, 1978). Since the 1950s, several research studies have used the Delphi method as highlighted by Linstone and Turoff (2002) which include risk analysis, healthcare and education (Bender *et al*., 1969; Judd, 1973).

5.3.1.1 (a) Overview of the Delphi Method

Following the original method which was developed in the 1950s, the Delphi method has evolved and been used across disciplines to reach an outcome based on a consultative basis. It is based on a structured process for collecting and synthesising knowledge from a group of experts by means of a series of questionnaires accompanied by controlled opinion feedback (Adler & Ziglio, 1996). It is also a method for structuring a group communication process to facilitate group problem solving, and to structure models (Linstone & Turloff, 1975). The method can be used as a judgment, decision-aiding or forecasting tool (Rowe & Wright, 1999), and can be applied to problems that do not lend themselves to precise analytical techniques but rather could benefit from the subjective judgements of individuals on a collective basis (Adler & Ziglio, 1996). The Delphi method is a mature and a very adaptable research method used in many research arenas by researchers across the globe. Green and Price (2000) have speculated on the future direction of facilities management using a Delphi panel in the UK. According to Turoff (1970), there are four possible objectives or secondary goals, for any Delphi exercise, namely:

1. To explore or expose underlying assumptions or information leading to differing judgments;
2. To seek out information that may generate a consensus of judgment on the part of the respondent group;
3. To correlate informed judgments on a topic spanning a wide range of disciplines;
4. To educate the respondent group as to the diverse and interrelated aspects of the topic.

Since Delphi is founded on the old premise that the opinions of more than one person are better, it utilises panels of participants to obtain information, and then systematically attempts to produce a consensus of opinion and, sometimes more importantly, to identify opinion divergence. It provides anonymity of both the participants and identification of the participants' statements throughout the exercise (Rowe & Wright, 1999). The participants are experts who have the following: i) knowledge and experience with the issues under investigation; ii) capacity and willingness to participate; iii) sufficient time to participate in the Delphi; and, iv) effective communication skills (Adler & Ziglio 1996).

Within the extended use of the Delphi Method, a series of communication between the experts shall be made, between which a summary of the results of the previous round is communicated to and evaluated by the participants. The second and successive rounds often produce a narrowing of the initial spread of opinions and the shifting of the median. If no consensus emerges, at least the disparate positions can become apparent (Gordon, 1971).

5.3.1.1 (b) Strengths and Weaknesses

The major advantage of a Delphi Method is that it permits the researcher to obtain an objective consensus of expert judgement on the subject under study. It also makes the rationale underlying a specific estimate or prediction explicit for everyone. There have been several studies supporting the Delphi method (Ament, 1970; Wissema, 1982; Helmer, 1983). These studies seem to suggest that, in general, the Delphi method is useful to explore and unpack specific, single-dimension issues. As Enzer *et al*. (1971) observe, Delphi sessions are usually better than other methods for eliciting and processing

judgmental data, since they maintain attention directly on the issue, provide a framework within which individuals with diverse backgrounds or in remote locations can work together on the same problems, and produce precise documented records.

Enzer et.al. (1971) further observed that the main weakness of the Delphi Method is that a truly perspicacious expert's judgement might be lost when a consensus that actually represents a range of judgements is presented. It is usually slow and time-consuming. If the Delphi is carried out through the mail with a large panel, each round could take several months. However, if it is conducted in a conference environment, the preparation of rounds and collation of responses could be a matter of hours.

5.3.1.1 (c) Administration and Implementation

The basic Delphi Method begins with a series of first round questions asked individually of experts to submit their judgements on the subject (Schmidt, 1997). The results of the first round judgements are then tabulated and the results are sent back to the experts for modification. In essence, the experts are asked in the second round to re-evaluate their original judgements in light of the average estimates calculated in the first round. This procedure of re-evaluation is continued for several rounds until a fairly high degree of consensus is reached, or until the experts no longer modify their previous estimates (Adler & Ziglio, 1996; Delbeq *et al*., 1975; Linstone & Turloff, 1975).

Selecting research participants is a critical component of Delphi research since it is their expert opinions upon which the output of the Delphi is based (Bolger & Wright, 1994; Parente et.al., 1994). The sample size varies in their studies from 4 to 171 'experts', as

such it can be concluded that there is no 'typical' Delphi; rather, that the method is modified to suit the circumstances and research question (Skulmoski *et al*., 2007).

5.3.1.1 (d) Sampling Design

For the preliminary study, the sampling is intentionally purposive, as this part of the study is intended to select the respondents to observe factors that influence office occupation (Creswell, 2008). The parameter of sampling interest is the experts in the office market in Kuala Lumpur. The unit of analysis required is the individuals.

The sampling frame is the list of elements from the population (Cavana *et al*., 2001). The sampling frame of this study comprises the office building owners/investors, building managers and property consultants that have dealt with office tenants. This sampling frame is as follow: Property consultants registered with the Institution of Surveyors Malaysia, Malaysia Institute of Estate Agents, and building managers of reputable office in Kuala Lumpur (selected from the list of buildings identified in the 'Classification of Office Buildings in Malaysia' report (Mohd, 2010)). Details of the invited experts are summarised in Appendix B.

5.3.1.1 (e) Design of the Preliminary Survey

The preliminary study utilises the Delphi Method, in which one hundred and twenty eight (128) factors/criteria derived from the literature and past studies are put forward for selection. Section A of the questionnaire provides the respondents' demographic profiles. This information provides the insight into the type of respondents who participate in this preliminary study. Section B lists the factors/criteria under the Main and Sub headings for respondent selection. These variables are measured on a 5-point Likert scale. The scale

starts at 1 (not very important) and ends at 5 (very important) with 3 (moderate) lying as the middle scale.

5.3.1.1 (f) Undertaking the Delphi Method

The Delphi panel and the Delphi Process

The focus of the study is to elicit knowledge and opinion from a broad cross-section of individuals with varying perspective on tenant selection for office space occupation decisions. The panel is therefore designed to have expert representatives from the property consultants/leasing agents who generally interact with prospective tenants and property/leasing managers of top grade office buildings in Kuala Lumpur. A total of forty (40) individuals (twenty from each group) were invited to participate in the first round of the study. The study was conducted under strict confidentiality condition throughout and anonymity was guaranteed to respondents.

The first round of the questionnaire was emailed to the panellists in mid November 2009. Reminder emails and telephone calls were made to follow up on those who did not respond (between late November and early December 2009). These resulted in a total of 27 panellists participating in the first round of the survey, giving a response of 68 per cent.

The first round responses were collated and analysed, and an interim finding was sent back to the respondents in late December 2009 for feedback and comments. The second round of the survey then followed whereby the same respondents were individually presented with the summary statistics of the group responses obtained in the first round and, in light of this information, were asked to re-evaluate their own original judgements; in the event

that their second round judgement differed substantially from that of the first round group average, they were invited to explain to account for the divergence. The procedure however was stopped at the second round because most of the respondents did not to vary in their responses from the ones that they gave in the first round. A total of 20 panellists replied to the second round out of 27, yielding a response rate of 74 per cent. The response from the second round showed strong convergence on the broad findings. Overall, it was felt that a third round of the study would not add further to the understanding provided in the first and second round and thus the study was concluded. This procedure is in line with the suggestion by Delbecq *et al* (1975) that a two or three iteration Delphi is sufficient in reaching consensus or uncovering sufficient information (Skulmoski et.al. (2007).

5.3.1.1 (g) Method of Analysis

The data collected in the field was analysed using SPSS (Statistical Package for the Social Sciences) Version 16**.** Descriptive statistics were used to calculate each of the factors' mean, mode and standard deviation values. Following El-Haram and Horner (2002), the factors were ranked by means of an importance index and calculated as follows:

$$\text{Importance index} = \left\{\sum_{i=1}^{5}(w_i \times f_{w_i})\right\} \times \frac{100}{5n}$$

Where w_i is scale given to the response *i*; *i* =1, 2, 3, 4, or 5 is the level of importance; f_{w_i} is the frequency for each scale ranging from f_{w_1} = not very important to f_{w_5} = very important and n is the total number of responses. All the factors were listed in descending rank order based on the importance index and the factors with the score of over 70 were retained. This takes into consideration of an adequate amount of factors to be considered

by tenants in the further analysis of the study. From the above, sixty (60) most important factors were selected to constitute the inputs for the Main Phase of the study.

5.3.2 Tenant Organisations Classification

As mentioned in Section 2.6, a field survey was conducted between the periods of November 2009 to January 2010 to gather the breakdown of tenant organisations at the office buildings in the study area into classification of economic activities in accordance to the Malaysian Standard Industrial Classification (MSIC) 2008. The main purpose of the MSIC is to provide a standard framework for classifying establishments in the given industry in all official statistics. It also serves as a standard reference to users of official statistics on the type of economic activities included under the various categories of industries. The standard form requesting the breakdown of tenant organisations' classification was given to each of the building management offices of the sixty-one (61) office buildings in the study. While conducting this survey, a compilation of the tenants' organisations at each of the buildings was also made. This information is to be used for the distribution of survey questionnaire of the main study.

5.3.3 Part II - Main Study

5.3.3.1 Pilot Test

Prior to the execution of the main stage of the study, a pilot test was conducted before the questionnaire survey was performed. It was crucial to perform the pilot test before implementation of the actual questionnaire (Neuman, 2006) in the main study. The purpose was to finalize the contents so that they were well and clearly understood by the respondents (Fellow & Liu, 2003) and in tandem with the information drawn from the

literature and the initial findings from the Delphi Survey. Its importance could not be denied as the improvements in the survey instruments ensured more reliable data during the major survey (Straub, 1989). Furthermore, it is also necessary to allow the instrument to be assessed, refined and improved before actual data collection (Creswell, 2008; Neuman, 2006). The indicators were pilot tested with the sample frame used to ensure the respondents had no difficulty in answering the questionnaire (Jang & Lee, 1988).

5.3.3.1 (a) Conducting the Pilot Test

The questionnaire was pilot tested on three (3) respondents who are tenants at purpose built office buildings in Kuala Lumpur. The questionnaires distributed to the respondents were self-administered. This procedure followed Hammersley and Atkinson's (1983) triangulation concept. After obtaining the comments of the first respondent, a 'second-opinion' was sought from the second respondent. The third was necessary in case the first and second respondents differed in their views. Feedback from the three showed that they held similar views. The first was that the attributes listed in the questionnaire were appropriate and the questionnaire was easy to understand. They also suggested minor refinements which were incorporated into the questionnaire before the second phase of the pilot survey.

The second phase of the pilot survey was conducted on ten (10) other tenants at purpose built office buildings in Kuala Lumpur city centre. The were drawn from the same population of the actual survey in terms of background, familiarity with the market and the behaviour as suggested by Malhotra (2002). This pilot survey is to increase the reliability, validity and usability of the survey (Newman & McNeil, 1998). The questionnaires were

mailed and after three reminders within a period of one month, a total of ten (10) questionnaires were returned indicating a 100% response rate. The Crobach alpha value of 0.69 provides an indication that the items in the questionnaire have an acceptable level of consistency since the value of between 0.65 and 0.95 is acceptable as specified by Chua (2006).

5.3.3.1 (b) Modification of the Questionnaire

As a result of the pilot survey, the necessary modifications were made to the questionnaires.

The pilot test was the way in which the questionnaires survey could be redesigned to ensure questions were clear and that the respondents had no difficulty in answering the questionnaire with consistent comprehension (Jang & Lee, 2001). After the pilot test, the total number of factors for the entire questionnaire under the four (4) main areas remained at sixty (60). It was expected that by redesigning the questionnaire, errors in the data collection could be avoided. The questionnaire survey is shown in Appendix C.

5.3.3.2 Phase I of the Main Study – Reduction of Factors

This phase of the study involves identification and reduction of the factors considered important by tenants through principal component analysis (PCA) (following Hair *et al*. (2006); Tabachnick & Fidell (2007)) and Importance Index. These methods were used to further reduce the sixty (60) factors to a number that Analytic Hierarchy Process (AHP) can cope with. The data or factor reduction was necessary to reduce the number of factors for the eventual use of AHP at a later stage.

5.3.3.2 (a) Sampling Design

In quantitative study, the sample selected should be representative of the population under investigation to enable generalisations and conclusions of the population. This sample should provide a robust and valid justification as mentioned by Cooper and Schindler (2008).

For the purpose of this study, the whole population of tenants at office buildings in Kuala Lumpur city centre was considered rather than a sample. This is to avoid an unanticipated low response rate. Similar studies have suggested that sampling tends to produce inadequate data due to the exceptionally poor response rate from this group of respondents (Ahmad, 2006, Adnan *et al*., 2009).

The population is drawn from the tenants of office buildings that had obtained a premier grade through an earlier exercise to classify office buildings in Malaysia (Mohd *et al*. 2010). Sixty-one (61) premier grade office buildings were identified in the study area (Kuala Lumpur City Centre commercial area) and a survey on tenants of these buildings was conducted from August to November 2009. A total of 1,127 tenant organisations were estimated from the directory listings as well as from information given by the office building management offices in the occupancy survey conducted earlier (see Section 2.6). There was reluctance on the part of several building owners and managers to provide updated list of tenants in their buildings. In fact, this later source would have provided added value in that it would identify the different types of ccoupiers whereas building directories do not. Working on the number of questionnaire sets that were returned by post

as undelivered (has vacated the space), it was established that the questionnaire sets had reached 502 tenant organisations.

5.3.3.2 (b) Questionnaire Design

The design of the questionnaire survey was geared towards identifying the important factors for the development of the TOS framework. The questionnaires have three (3) sections as described below:

(a) Section A covers the demographic status of the respondents with the goal of identifying their profiles. Although the survey packages were addressed to the managing directors, lower ranking staff may be directed to respond to the survey. Questions also relate to the number of years the organisation is established, legal status, business coverage, size of business, and number of staff. These particulars would be useful in relation to the responses given in Section C of the questionnaire. The years of office occupation was also requested, to see if the respondents had the relevant knowledge and experience to accurately answer the questionnaire relating to office occupation in order to give credence to the data collected.

(b) Section B covers the lease particulars of the current space occupied by the respondents. The current rental rate, size of occupied space and length of lease were asked to determine the nature of office occupation of existing space. This would relate to the profile of the respondents in Section A and the choice of the preference of criteria selected in Section C of the questionnaire.

Section C provides the list of factors for tenants' selection in identifying the most important factors under each identified main category. The questions were of the 'closed' type, that is, typical attributes were identified for respondents to indicate the level of importance; this is in contrast to 'open' type questions which would require respondents to list down the attributes and then rate their importance. According to Nkado (1995), the closed format is more advantageous because it is easier to respond to and consequently will improve the response rate, and the terminology is limited and standardized which then simplifies subsequent analysis.

5.3.3.2 (c) Instrument

The questionnaire survey was used as an instrument to identify the important factors selected by tenants. These instruments originate from two sources. The first source was from the criteria/factor descriptions that were derived from the previous literature. The second source was from the empirical findings gathered through experts' opinions conducted through Delphi Method (see Section 5.3).

In this study, factors for tenants' office occupation were presented under the heading of four (4) main areas, as in Table 5.2.

Table 5.2: Summary of the Main Area and Factors used for the Identification of Importance before The Principal Component Analysis.

Main Area	Factors	Total
1. LOCATION	• Branding/Image/Prestige • Access to Market • Access to Amenities • Access to Skilled Labour • Proximity to Support Service Supplier • Proximity to Clients/Market	11

	• Accessibility to Public Transportation & Terminal • Accessibility by Private Vehicles • Proximity to Major Trunk Road/Highways • Level of Criminal Rate • Traffic Condition	
2. LEASE FEATURES	• Renewal Terms • Length of Lease • Termination Clause • Payment of Monies Terms • Alteration and Renovation Clause • Incentives • Compliance to Law and House Rules • Repair and Insurance Clause	8
3. BUILDING	• Age of Building • Design of Entrance and Foyer • Modern Prestigious Building • Quality & Presentation of External Finishes • Building Visibility • Building Identity/Image • Architectural design & building finishes • Security & Access Control • Responsible management and maintenance teams • Maintenance Policy • Cleaning/Housekeeping Services • Safety Policies & Procedures • Fire Prevention & Protection • After Hours Operation • Floor-Ceiling Height • Building Size • Flexible Space layout & floor plate • Orientation of office space • Availability of space for future expansion • Comfortable & Secure Working Environment • Space Efficiency • Column Layout & sub-divisibility • View • Underfloor Trunking • Energy Efficient/Green Buildings	38

	• Toilet & Sanitary Facilities • Air-Conditioning & Ventilation System • Electricity systems & provision • Modern IT & Telecommunication system • Entrance/Foyer Accessibility • Building Automation & Energy Management Systems • Control of Building Services • Ease of Entrance Usage & capacity • Passenger Lift Performance & control • Adequacy of Good Access & circulation • Car Park provision & Accessibility • Building Wayfinding • Food & Beverage Outlets	
4. FINANCIAL/COST	• Rental Rate • Cost of Fit Out • Total Occupancy Cost	3

5.3.3.2 (d) Data Collection and Procedure

In this study, the questionnaire survey was used to collect the data. As iterated by Fowler (1993), this technique has its attraction in facilitating standard data gathering. The questionnaire forms were self-administered to ensure that an adequate amount of data was collected through the various ways of distribution (Sierks, 2003). The self-administered survey was preferred by the researcher to ensure the questionnaire can be distributed to a large number of respondents within a reasonable time frame at a lower cost (Bernard, 2006; Trochim, 2006). All 1,127 questionnaires were self-delivered or sent out by mail or email. The questionnaire was accompanied by a covering letter (see Appendix C) addressed to the managing director, which introduced the theme of the research and guaranteed respondents' anonymity. The complete survey package comprised the covering

letter, questionnaire, and pre-stamped and self-addressed envelope. The respondents were given one month to reply to the survey.

While the mail survey is suitable where the sample size is large, a major disadvantage is the low response rate. To mitigate this problem, several measures were adopted. First, the questionnaire was limited to three (3) pages and designed in such a way that it was easy to fill. Second, the questionnaires were personally addressed to the chief executive officer or the managing director of the tenant organisations to convey the importance of the survey. At the same time, the advantage of addressing the questionnaire to the top management of the organisation is that they can effectively identify and delegate the task of completing the questionnaire to the real estate/middle management personnel in the firm who can go by many job titles. Third, the questionnaires were sent out in three waves. Two weeks after the first batch of questionnaires was sent, a reminder postcard followed together with a personal phone call. Where firms had not responded, another set of questionnaires was dispatched two weeks later via email or a telephone follow-up interview was conducted. Fourth, the survey pack comprised a cover letter explaining the rationale and scope of research, the survey questionnaire and a self-addressed pre-paid envelope. The data set was collected between January 2010 and July 2010. This period covers data gathering for both the pilot test and the data collection for the first phase of the main study. The data collection for the pilot study took about one (1) month, January 2010, while the data collection for the first phase of the main study was conducted from February 2010 to July 2010.

For the main quantitative study, a total of 185 responses were received. Only one hundred and seventy nine (179) (out of five hundred and two (502)), which gives a response rate of

36%, were then selected for data analysis. Three (3) respondents were left out because they did not meet the sampling criteria (respondents were restricted to only tenant organisations and not owner-occupier respondents) while the remaining three (3) were dropped due to lack of completeness in answering the questions.

5.3.3.2 (e) Method of Analysis

The data set collected in the main study was subjected to several procedures before it could be analysed. The coding was prepared first and then the data file structure was developed. Subsequently the data set was entered in the SPSS Version 16 where screening and cleaning of data was performed. Several appropriate statistical tools were then selected.

In order to answer the research questions, data set was analysed according to the way the questionnaire was designed to match with the appropriate application of statistical analysis. For the quantitative data sets, the statistical analysis tools to be used to analyse the quantitative data sets are by employing SPSS Version 16.

There are two sets of statistical methods used to analyse the quantitative data set in this study. One is the descriptive statistic and the other the multivariate statistic. Descriptive statistics was used to analyse the background or profile of respondents (Section A) and the lease structure (Section B). It analysed the patterns of the data set by summarizing in terms of general tendencies (the mean), and the frequency to describe the phenomena of interest (Creswell, 2008; Cavana *et al*., 2001). The multivariate statistics involved the Principal Component Analysis (PCA) which was intended to reduce the number of factors identified earlier in the Preliminary stage of the study.

5.3.3.2 (f) Reduction of the Number of Factors – Principal Component Analysis and Importance Index

The data sets in Section C were gathered to reduce the variables to a number acceptable for further analysis using the MCDM techniques. The variable reduction process involved two stages. In the first stage, principal component analysis (PCA) was employed to reduce the number of factors. The reduced list was then compared against the factor list that had earlier been identified based on the Importance Index methodology. The final selection of the factors was used as criteria in the AHP method.

(i) Principal Component Analysis

Principal Component Analysis is one of the techniques used in Factor Analysis. Factor Analysis refers to a statistical technique that summarises the relationships among the original variables called factors or components (Hardy & Bryman, 2004). It is a collection of methods used to examine the underlying structure or the structure of interrelationships (or correlations) among a large number of variables (Hair *et al*., 2006). According to Jugdev and Muller (2005), the method of reducing the variables and measuring them is advisable, rather than having a large number and not addressing them properly. The multivariate technique of PCA provides a versatile set of statistical tools for investigating the underlying latent dimensions or constructs represented in a set of variables or attributes. The technique is often adopted to reduce the number of items to a manageable size, either for ease of interpretation or for input to subsequent analyses (Kinnear & Gary, 1994; Malhotra, 1996; Hair *et al*., 1998, Ibrahim & Goldrick, 2006). It is well documented that the technique has long been accepted as a data reduction technique (Thurstone, 1947; Marman, 1967; Caltell & Dickman, 1962). Essentially, the technique's procedures involve a series of iterations where a set of

composite factors is generated, each typically representing a grouping of correlated variables within the original set.

The Bartlett's test of sphericity and KMO are employed to determine the suitability of the dataset for treatment with factor analysis and PCA. A high value of between 0.5 and 1.0 on any of these tests indicates that the factor analysis or PCA is appropriate, while a value below 0.5 implies that the use of factor analysis or PCA may be inappropriate (Kline, 1994; Malhotra, 1996). Kaiser (1974) and Kinnear and Gray (1994) suggested that a KMO value of less than 0.5 should be considered as insufficient and unacceptable for the application of this technique. For reliability measurement, Cronbach's Alpha is one of the most common tools to use, with scores (alpha) that lie in the range of 0 to 1 (Cronbach, 1951). In this study, an alpha score of 0.7 has been imposed as the minimum acceptable.

To be credible, a factor analysis or PCA ought to be parsimonious, in that the number of factors it ends up with should be considerably less than the number it starts with. In terms of the application of the technique, Kline (1987) emphasised the critical condition that the number of subjects (respondents) must exceed the number of variables while Osborne and Costello (2003) went a step further by specifying 200 as desirable minimum for the sample size. Given that the respondents were only one hundred and seventy nine (179), the Osborne and Costello's desirable minimum was not complied with by a narrow margin. However, since this number exceeds the number of variables, the study fulfils Kline's critical condition so as to remain valid. The earlier identified sixty (60) factors are divided under four (4) main areas and the

principal component extraction method and varimax rotation were used for the data reduction exercise.

(ii) Importance Index

To make a comparison of the important factors to be used in the AHP analysis, the Importance Index ranking was also adopted. All the factors were listed in descending rank order based on the importance index.

5.3.3.3 Phase II of the Main Study – Relative Weights of Important Factors (AHP Method)

5.3.3.3 (a) Structuring Attributes (Factors) into a Hierarchy Tree

The final selected factors from the PCA and Importance Index ranking were then used to construct the AHP hierarchy tree. The hierarchy tree depicts the objective/goal of the decision with the lower level showing the main areas and factors. As the purpose of AHP for this study is to gather the weights and ranking of importance of the factors for the development of the TOS framework, the specific alternatives shall not be highlighted. Based on twenty six (26) factors generated from the PCA and Importance Index (II), a hierarchy tree needs to be constructed (see Section 4.6). In this study, three levels of hierarchy were designed. The highest level objective is labelled as a 'goal', the intermediate level objective is labelled as 'criteria', while the lowest level objective is called 'sub criteria' (see Section 4.6). Therefore, for the purpose of this study, the four (4) main areas and twenty six (26) factors shall be labelled as 'criteria' and 'sub criteria' respectively.

The hierarchy tree for office space preference by tenants is shown in Figure 5.2. The overall objective for carrying out the evaluation is to identify the relative importance of the factors of the four (4) main criteria and twenty six (26) sub criteria. The four main criteria are location, lease features, building and financial/cost. Under each main heading, the hierarchy tree shows the intermediate level criteria (or sub criteria). Each criterion is then evaluated and rated (see Section 4.6). The overall goal was assumed to be the achievement of 'the most preferred office space'. A simple hierarchy was adopted with an upper level that distinguished the four main criteria.

At the upper level, the respondents made pair-wise comparisons between the four groups of main criteria. For each pair, the respondents were asked to assess which factor was more important in the decision making process. The sub criteria are the bottom level to reflect the factors that may influence the various attributes of the main criteria. In order to develop the TOS indicator with the AHP, the following steps were taken:

1) Define the Tenant Preference Measurement for Office Space; adopted and formulated from an earlier study to classify office buildings in Malaysia (Daud *et al*., 2011, Adnan *et al*., 2009).
2) Construct a hierarchy of important criteria and sub criteria, which was earlier identified by literature and confirmed through expert opinions.
3) Employ a pair-wise comparison method for the criteria.
4) Compute the consistency level to change the responses of the inconsistent ones.
5) Compute relative weights of each criterion.

The detailed explanation of the steps taken for the AHP approach (see Section 4.6) is as follows:

Step 1: Construct the hierarchy of the Main Criteria and Sub criteria

The main and sub criteria were determined through a literature search on office occupation and through an expert opinion survey from which the important criteria were identified. Due to limitation of the MCDM approach, which limits the number of variables to be used in its analysis, the identified criteria were then reduced to a manageable number by adopting the PCA and Importance Index methods. The criteria were then structured into three (3) levels to form the Tenant Preference Decision Hierarchy (Figure 5.2). Level I is the objective or overall goal of the preference assessment, which is to determine the relative weights of the main and sub criteria for office space which will then provide an indication of the preference weight for the identified measures for an office building determined earlier. Level II and III: the second level represents the scope of the criteria assessment. The main criteria at Level II are the broad areas which have been identified to encompass the main elements influencing tenant consideration in office space selection. The preference is further assessed at Level III where the broad criteria in Level II are further broken into detailed elements.

Step 2: Employ pair-wise comparison

Once the criteria hierarchy has been constructed, the next step is to determine the priorities of the elements at each level ('elements' means every member of the hierarchy). To begin the AHP process, a set of comparison matrices of all elements in a hierarchy with respect to an element of the immediate higher hierarchy are constructed so as to prioritise and convert individual comparative judgements into ratio scale measurements. The preferences are quantified by using a nine-point scale (explained earlier in Section 4.6). In the AHP approach, information and priority weights of the elements may be obtained from the

decision maker of the organisation identified in the study. This could be made through direct questioning or a questionnaire method (Wu *et al*., 2007).

Step 3: Computing the Consistency Level

The pair-wise comparisons generate a matrix of relative rankings for each level of the hierarchy. After all the matrices are developed and all the pair-wise comparisons are obtained, eigen-vectors or the relative weights (the degree of relative importance amongst the elements), global weights and the maximum eigen-value (λ_{max}) for each matrix are then calculated. The λ_{max} value is an important validating parameter in AHP. It is used as a reference index to screen information by calculating the consistency ratio (Saaty, 2000) of the estimated vector in order to validate whether the pair-wise comparison matrix provides a completely consistent evaluation. The calculation of the consistency ratio has been explained in Section 4.6. For the purpose of this study, the calculation of the consistency index (CI) has been determined in the Expert Choice™ software.

Step 4: Computing Relative Weights of Each Criteria

Saaty (1996) points out that if there are more than two levels, the various priority vectors can be combined into priority matrices which yield one final priority vector for the bottom level. Local priority is the priority relative to its parent. Global priority also called the final priority, the priority relative to the goal.

Step 5: Determination of Relative Weights for Each Tenant Group

Having determined the various tenants' groups at the office buildings at the study area (see Section 5.3.2), the comparison of the three (3) main sectors of tenant organisations, i.e.,

Banking/Finance, ICT & Media and Oil & Gas is made. The relative weights of the sectors are then compared.

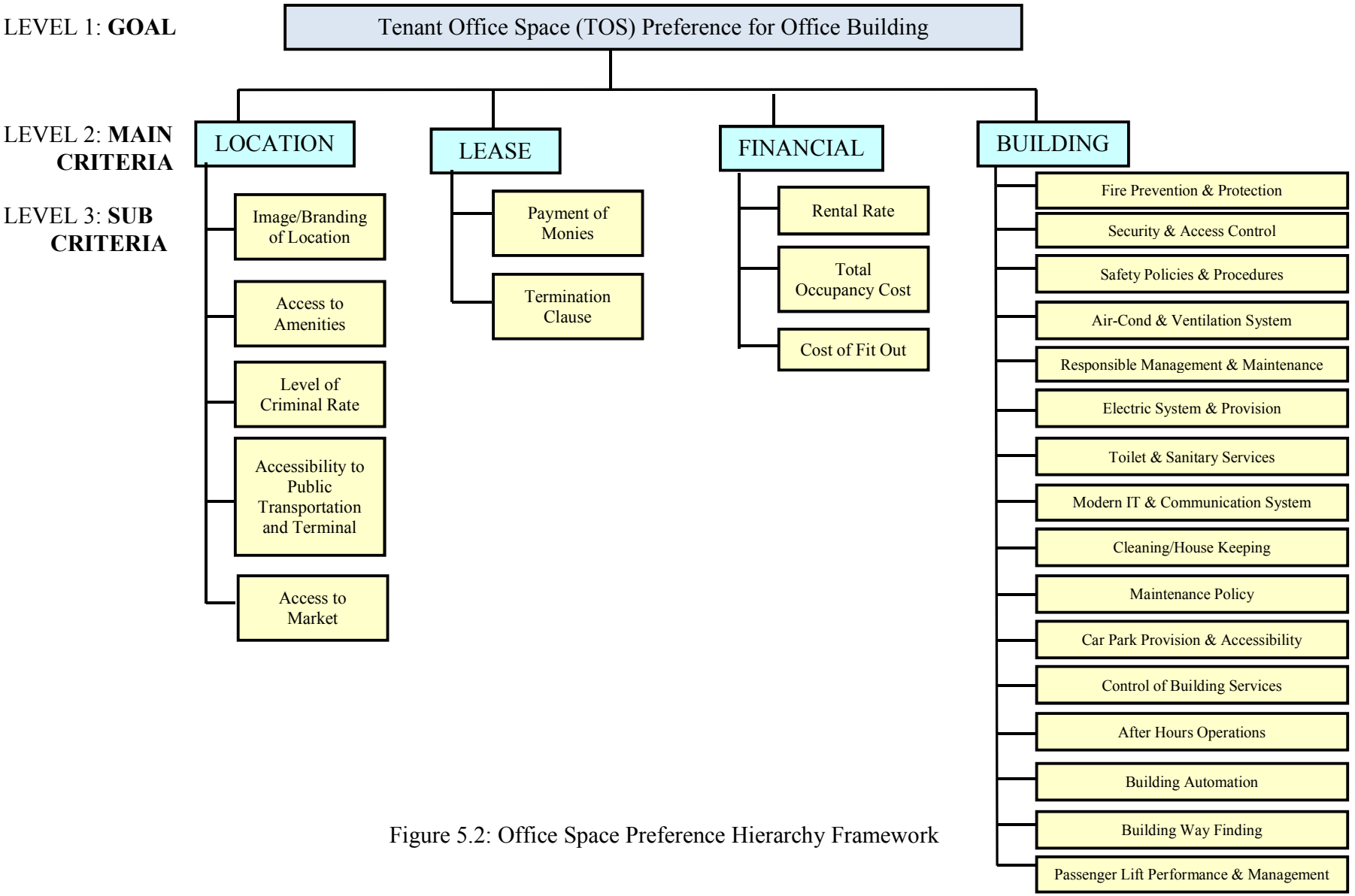


Figure 5.2: Office Space Preference Hierarchy Framework

5.3.3.3 (b) Sampling Design

For the second phase of the main study, the responses were gathered from the selected tenants groups. As mentioned in Section 2.6, a survey of the tenants' profiles according to business sector was made and the breakdown of the sector groups is revealed. The three main categories of tenant organisations occupy approximately 40% of the space within the study area. They are from the Finance & Banking, ICT & Media and Oil & Gas industries. Since one of the objectives of the study is to determine the relative weights of the various categories of tenants with different profiles, one clear difference between them will be in terms of size. The definition of small and medium sized enterprises (SMEs) or organisations was adopted from the Small and Medium Enterprises Development Corporation (SMECORP), Malaysia. The small enterprises within the given definition for the services sector are those with the sales turnover of between RM200,000 and RM1 million or having full time employees of between 5 and 19. The medium enterprises are defined as the enterprises with sales turnover of between RM1 million and RM5 million or having between 20 and 50 full-time employees. Those organisations exceeding the limits of the definition are considered large.

In carrying out the selection of the panel of decision makers for each category of tenant, various listings of organisations, associations or groupings have been referred to. This includes the list of financial institutions listed with Bank Negara (Central Bank), Malaysia; The Multinational Companies in Malaysia compiled by Business Monitor International, United Kingdom; public listed companies on the Kuala Lumpur Stock Exchange; as well as listings from the various trade organisations and associations such as Malaysia Super

Corridor (MSC) status companies, Malaysian Oil and Gas Services Council (MOGSC) and Association of Accredited Advertising Agents Malaysia.

AHP is a method that does not necessarily involve a large sample and it is useful for research focusing on a specific issue where a large sample is not mandatory (Cheng & Li, 2002; Lam & Zhao, 1998). Cheng and Li (2002) pointed out that AHP method may be impractical for a large sample size as 'cold-called' respondents may have a high tendency to provide arbitrary answers, resulting in a high degree of inconsistency. Thus, for this study, a total of sixty (60) companies were selected comprising ten (10) companies of small and large organisation status from the three (3) respective tenants' organisation groups. All the companies are located within the office buildings in the study area. The breakdown of the profiles of the selected organisation is shown below in Tables 5.3.

Table 5.3 Breakdown of Tenants Who Were Sent The Survey Package

Categories	*Number of tenants*	*Large*	*Small*
Finance & Banking	20	10	10
ICT & Media	20	10	10
Oil & Gas	20	10	10
Total	60	30	30

5.3.3.3 (c) Questionnaire Design

The design of the questionnaire for the AHP method was geared towards identifying the relative importance of the selected criteria on a pair-wise comparison towards the development of the TOS framework. The questionnaires were designed to include three (3) sections as described below:

(a) Section A covers the demographic status of the respondents with the goal of identifying their profiles. Although the survey packages were addressed to the managing directors,

lower ranking staff may be directed to respond to the survey. The respondents were asked to indicate the legal status, business coverage, size of business, and number of staff in order to check the different categories of respondents in relation to the responses given in Section B of the questionnaire. The years of office occupation was asked to acknowledge if the respondents had the relevant knowledge and experience to accurately answer the questionnaire relating to office occupation to give credence to the data collected.

(b) Section B provides the list of main criteria for tenants' selection in identifying the most important criteria under each identified main criteria. The criteria are compared on a pair-wise basis covering all the given criteria.

(c) Section C provides the list of sub criteria for tenants' selection in identifying the most important criteria under each identified sub criterion. The sub criteria are compared on a pair-wise judgement under each respective Main Criteria headings.

5.3.3.3 (d) Instrument

The questionnaire survey was used as an instrument to identify the relative importance of the main and sub criteria selected by tenants by determining the relative weights and ranking of importance from the respective tenants' groups. These instruments originate from the earlier determined criteria from the preliminary phase as described above (see Section 5.3.1). The criteria are arranged in a pair-wise selection format so that the respondents are able to carry out the selection effectively. A copy of the questionnaire is shown in Appendix E.

From the PCA and Importance Index methods for factor reduction, the list of criteria to be used in the AHP method is summarized in Table 5. 4.

Table 5.4: Summary of The Main And Sub Criteria Used For the Identification of Importance

Main Criteria	Sub Criteria	Total
1. LOCATION	• Image/Branding of Location • Access to Amenities • Level of Criminal Rate • Accessibility to Public Transportation & Terminal • Access to Market	5
2. LEASE FEATURES	• Payment of Monies • Termination Clause	2
3. BUILDING	• Fire Prevention & Protection • Security & Access Control • Safety Policies & Procedures • Air-Cond & Ventilation Systems • Responsible Management and Maintenance Team • Electric System & Provision • Toilet & Sanitary Services • Modern IT & Communication Systems • Cleaning/House Keeping • Maintenance Policy • Car Park Provision & Accessibility • Control of Building Services • After Hours Operations • Building Automation • Building Wayfinding •Passenger Lift & Performance	16
4. FINANCIAL/COST	• Rental Rate • Total Occupancy Cost • Cost of Fit Out	3

5.3.3.3 (e) Data Collection and Procedure

The questionnaires were self - delivered (to ensure that the relevant personnel of the selected organisations receive them). All sixty (60) questionnaires were self-delivered manually to respondents. While attempts were made to gather the responses from the

respondents through the first meeting, not many agreed to provide the same. Wherever possible, the designated person assigned to assist in the survey was briefed regarding the AHP questionnaire. In cases where the designated persons seek to complete the questionnaire, the average time for the briefing as well as completion of the questionnaire session took half an hour to forty five minutes. As some of the respondents wanted to complete the questionnaire at a different time, enumerators were assigned to gather the final completed questionnaire. Whenever the designated person (respondent) were not available, telephone and email particulars were collected so that the necessary follow up could be made at a later period. The questionnaire was accompanied by a covering letter (see Appendix E) addressed to the managing director or chief executive officer, which introduced the theme of the research, requirements and instructions for completion and guaranteed respondents' anonymity. The complete survey package comprised the covering letter, questionnaire, and pre-stamped and self-addressed envelope. The respondents were given up to two (2) weeks to respond. Once the completed questionnaires were analysed using Expert Choice™, any inconsistency in response necessitated a follow-up, either via another face-to-face meeting or through a telephone interview with the respondents. This is to ensure that the responses are consistent. The data set was collected between August and November 2010. This period also covers the data gathering of the contact person's particulars and organisations' details as well as the main data collection for the AHP survey.

For the AHP study, a total of thirty (34) responses were collected. Only 28 were selected for data analysis and the remaining six (6) responses were left out. This is due to the poor response to questions where one or many sections of the questionnaires were left out by

respondents, and the poor response to follow-up meetings or telephone interviews to make the necessary changes to the earlier given responses.

5.3.3.3 (f) Method of Analysis

The results of all the pair-wise comparisons within each group of criteria or sub criteria are amalgamated to place the criteria on a ratio scale of their importance. The pair-wise ratios form a matrix of the relative importance within each group. It is assumed that the comparisons are reciprocal (if A is twice as important as B, B is half as important as A). The AHP generally uses the normalized eigen-vector associated with the largest eigen-value of this matrix to calculate the weight to be attached to each criterion (Forman & Gass 2001; Saaty, 1990). The principal vector of the matrix will have weights totalling approximately one and these are normalised to total exactly one. It has been claimed that a simple averaging solution is admissible (Bender *et al*., 1998) but Saaty (2003) argued the importance of adopting his original approach, which is used by the Expert Choice™ software, as is the case in this study. Amalgamating the pair-wise comparisons has been verified by experiment to accurately reflect the relative importance of the criteria on a ratio scale (Forman & Selly 2000).

However, pair-wise comparisons within a group are not automatically consistent. The greater the need to normalise the weights of the principal vector, the less consistent are the pair-wise ratios. Saaty (1980) defined an Inconsistency Ratio, based on the difference between recorded weights and values from a matrix generated at random (Saaty 1994; Forman & Selly, 2000). An Inconsistency Ratio (IR) of more than about 10 per cent would

warrant further investigation into the structure of the model, and the user's expertise or interest in making the comparisons (Forman & Selly, 2000).

The data set in this study utilises Expert Choice™ in determining the relative weights and global weights of the criteria. It also enables the determination of IR whenever the value exceeds 0.1, thus requiring an examination of respondents' choices of selection.

5.3.3.3 (g) Assessment of the Weights and Ranks of the Main Tenants' Factor Preference

To make an assessment of the differences of the responses or preferences of the three (3) sectors tenants' groups' for the office occupation factors, the relative mean weights and the ranks of these weights are compared. The mean has an advantage since further statistical tests are to be carried out with the data as most of the common statistical tests such as t-test, analysis of variance (ANOVA) and multiple comparison procedures are based on comparing the means. Thus, the assessment of the means and ranks of the different tenants' profiles can be made as follows:

i) Difference in mean weights

To identify the differences in the mean weights of the office occupation criteria that have been selected by various sectors and categories, comparisons of the mean global weights between the three (3) groups were made. ANOVA is the most appropriate test of significant difference for more than two (2) groups. The ANOVA test was generated using SPSS and the results were used to make the comparison. However, as the number of the participants for each group (from the three sectors) does not exceed 15, the use of ANOVA

would not be suitable (Chua, 2006). Another possible appropriate test of significance is the t-test. The t-test is then conducted on the pair of groups to gauge whether there are significant differences among global weights. This is taking into consideration that the conditions for the test are met, which include amongst others that the sample size is approximately 10 or more (Chua, 2006). A total of three pairs of comparison can be made among the three sectors of tenants.

ii) Spearman's rank correlation

Spearman's rank correlation or Spearman's rho is a non-parametric measure of statistical dependence between two variables. It is also defined as Pearson correlation coefficient between ranked variables (Myers & Well, 2003). It assesses how well the relationship between two variables can be described using a monotonic function. If there are no repeated data values, a perfect Spearman correlation of +1 or -1 occurs when each of the variables is a perfect monotone function of the other. A value of +1 indicates a perfect relationship; a value of -1 indicates a perfect inverse relationship. Values near zero indicate no relationship.

5.3.4 Assessment of Validity and Reliability of Instruments in the Study

It was crucial to check validity and reliability (Kline, 2005; Hair *et al*., 2006) of the instruments before the actual measurement of the construct of the framework of this study was conducted. Lack of validity and reliability could result in measurement error (De Vaus, 2002), a situation whereby the degree of observed variable does not represent the actual data (Hair *et al*., 2006). More importantly the checking of validity and reliability

demanded goodness of measures (Hair *et al*., 2006) The evaluation of the reliability and validity instruments were prescribed in the following manner.

5.3.4.1 Assessment of the Reliability of Instruments

Reliability assessed the "degree of consistency between multiple measurements of a variable" which means that a repeatedly identical result obtained indicated that the measures were stable and consistent. (Hair *et al*., 2006; Creswell, 2008; De Vause, 2002; Sekaran, 2006). As mentioned by Hair *et al*. (2006) the objective of reliability was to ensure the response across the time period does not vary and the time measured at any point was reliable. During the first phase of the main study, Cronbach's Alpha, as one of the most common tools, was used, with scores (alpha) that lie in the range of 0 to 1 (Cronbach, 1981). In this study, an alpha score of 0.7 has been imposed as the minimum acceptable.

The internal consistency in AHP is conducted as per the exercise mentioned in Section 4.5. Any inconsistent weights will have to be reconsidered before the final weights are derived in the matrix.

5.3.4.2 Assessment of the Validity of Instruments

A valid instrument or scale means it measures what it was supposed or intended to measure, and that the measurement makes sense and meaning for the drawing of conclusion (Creswell, 2008; Thompson, 2003; De Vause, 2002). In this study, checking for the validity of the instruments used involved primarily content validity (Campbell & Fiske, 1959). Content or face validity assesses the correspondence between the individual items or between the concept through ratings by expert opinion and pretest or pilot test (Hair *et*

al., 2006, Kline, 2005). It is also the extent in which items or variables belong to the construct or factor (Isik *et al*, 2009). The objective was to select to scale with consideration of the theoretical, empirical and practical issues whereby expert opinion on the item content should be the basis or representative to the domain it is supposed to measure. (Hair *et al*., 2006; Kline, 2005). Thus, face validity was considered the best form of ensuring that the instruments remain consistent, and was adopted in the expert survey on the preliminary part of the study.

5.3.5 Development of Tenant Office Space (TOS) Preference Framework

Development of the TOS framework involves identification of the measures for the criteria/factors and the relative weights that have been determined by AHP by the three (3) main tenants' sectors.

5.3.5.1 Indicators of the Measures of the Tenant Office Space (TOS) Framework

In determining the measures for the criteria/factors, the measures for assessment of office building are adopted from an earlier study to classify office buildings (Daud *et al*., 2011; Adnan *et al*., 2009). These measures are then reconfirmed with the panel of tenants' organisations' experts who are familiar with the assessment of the measures for their office occupation decision making. Six (6) experts (representing all three sectors) out of twelve (12) who were invited in this exercise provided the reconfirmation of the measures. The twelve (12) experts' groups comprised the building/facilities managers of tenants' organisations from the three sectors. Four (4) managers from each sector were invited to participate. Details of the measures confirmed by the tenants' experts are indicated in Table 5.5 below.

Table 5.5: Proposed Measurements for Factors of TOS framework

	Sub criteria/Factors	Proposed Measurement/s
1. Location	Branding/Image	Within established Office Area, e.g., Golden Triangle
	Access to Market	Face-to-face contact with customers and suppliers
	Access to Amenities	Distance to amenities (within 250m/500m/1km)
	Access to Public Transportation	Distance to terminal or station (within 250m/500m/1km)
	Level of Criminal Rate	No of Crime Incidence/Reputation
2. Lease Features	Termination Clause	Flexibility of the provisions for termination
	Payment of Monies	Flexibility of the provisions for the payment of the monies, e.g., rent, service charge, other payment due in compliance of the lease terms
3. Building Provision Features	Security and Access Control	Equipped with CCTV, security control desk, card access
	Responsible Management and Maintenance Team	On site operations team (24 hours) with Customer Relation Management
	Cleaning/Housekeeping	Quality common area presentation and maintenance
	Safety Policies and Procedures	Availability and adherence of policies and procedure for hazards and emergency situations
	Fire Prevention & Protection	Availability of the Detection & Prevention elements & procedures
	After Hours Operations	Availability of after hours services
	Toilet, Sanitary & Facilities	Provision of quality fittings, maintenance and upkeep
	Air Conditioning & Ventilation System	Provision of central air conditioning and ventilation system
	Electrical System & Provision	Provision of uninterrupted power supply and ability to meet occupiers' requirement
	Modern IT & Telecommunication	Provision of modular underfloor trunking, rise, broadband, WiFi, common antenna, etc
	Building Automation & EMS	Availability of Building Automation to automate services
	Control of Building Services	Availability of access to control building services, e.g., call up features to Building Management
	Passenger Lifts Performance & Control	No of passenger lifts, handling capacity and lift speed
	Car Park Provision & Accessibility	Provision of Parking Bays and Accessibility
	Building Way finding	Availability of Signage and Tenants' Directory
4. Monetary /Financial	Rental Rate	Lowest (Market/Non Market)
	Cost of Fit-Out	Lowest (Market/Non Market)
	Total Occupancy Cost	Lowest (Market/Non Market)

(Source: this study, 2010)

To complete the TOS framework, the results from the AHP relative weights formed the other part of the framework. Using the relative weights, the preference for each of the criteria/factors for different types and sizes of organisations were then used to develop the

TOS framework indicators, which would be able to show the most suitable tenant organisation profile when a vacant office space is to be leased.

5.3.6 Validating the Framework

5.3.6.1 Purpose of Validating the Framework

Cusack (1984) suggested that after a model is constructed, it should be tested before it can be put to use. He recommended that the data used for testing should be different from that used in making the model so that any inherently defective data is not used again when testing the model. He suggested that models are not expected to be perfectly correct and it is highly unlikely that complete accuracy will ever be achieved. He emphasized that a model can only represent a logical deduction drawn from an imperfect set of assumptions. In this study, the purpose of validation is to find out if the TOS framework has the ability to identify the 'appropriate suitable tenant' by correctly identifying the more suitable tenants for a given office space.

Larichev *et al*. (1995) suggested that a model is considered to have made the right decision when it is able to identify the option that is consistent with the decision maker's preference. However, they also found that identifying the right decision option is very difficult because many multiple attribute decision tasks do not have a right answer or because an objectively best decision does not exist. Moreover, the individual preference system of the decision maker is implicit and has no exact description. Sometimes, decision makers also make the wrong decisions. In this instance, the model may have given a right decision, but the decision maker had made a mistake in the selection (Chan, 1995). Another instance is when the decision maker makes the wrong decision but is satisfied

with the decision. This happens when the model is not properly constructed. Checks on the model would have to be carried out to identify errors and weaknesses.

5.3.6.2 Validation Methods Used by Others

Models have been validated to various degrees of rigour. At the less rigorous end, experts are invited to comment on the models. In the selection of factors using the Multi Decision Making (MCDM) models, the construction industry has developed several selection models. For example, Tam and Harris (1996) validated their model for assessing building contractors' project performance by conducting three interviews with potential model users. Potter and Sanvido (1995) validated their Design and Build (DB) prequalification system by conducting telephone surveys with four experts to obtain their general views on the model. A more rigorous method compares the outcome of an independent measurement with the answer given by the model. This is to determine the model's ability to arrive at a similar conclusion. Liston (1994) tested his model by working with a number of owners to evaluate eleven (11) contractors. The contractors were evaluated using his model that classified the contractors into different categories ranging from 'unsatisfactory' to 'outstanding'. These same eleven (11) contractors were also assessed by owners using their own in-house evaluation methods, and also classified from 'unsatisfactory' to 'outstanding'. The results from these two modes of evaluation were then compared to see if the model categorised the contractors in a similar manner as in-house evaluation methods. This method would be suitable for this study if there is currently a method that has been developed to assess office space suitability for tenants (see Section 3.4).

5.3.6.3 Framework Validation

As there are no previous models against which to assess office space for tenants suitability, this study takes the approach to validate the TOS framework by seeking selected tenant organisations' preference on the determined main criteria as well as identifying their preference for office space at selected office buildings within the study area. Following Liston (1994) that used the evaluation method and then used an in-house method to compare the outcome, this study utilises the approach of testing the framework's outcome with the outcome of the tenants' preference for a given set of office space attributes.

A total of twenty (20) tenants (representing the three sectors) with more than three (3) years of office occupation in Kuala Lumpur were chosen as sample. Since the standard office tenancy period is three (3) years in Malaysia, the tenants were considered to be suitably qualified to provide responses that involve elements of judgement and decision-making concerning the lease, rent, location and building. Of those, only sixteen (16) participated in the exercise that was conducted during December 2010 to February 2011. In the exercise, each tenant was first asked to place a suitable rank on each main criterion and then to make decision concerning whether they would consider renting the office space at selected buildings should they be offered a space to rent. The ranks which these tenants had placed on the main criteria were then correlated against those obtained in this study using the Spearman Rank Correlation test. The selection of the preferred office buildings by each tenant sector was also compared with the score that the TOS framework generated for each profile of tenant sectors.

If there was high correlation between the two sets of scores, this would mean that the framework was able to reflect the tenants' preference. In addition, should the selection of buildings chosen by the tenants match the ones generated by the TOS framework, it would indicate that the TOS framework is able to make an assessment of the suitability of an office space against the preference of each tenants sector and profile. The implication would be that the framework was able to guide an office space provider or marketer to more quickly find tenants for the available rentable office space.

5.4 SUMMARY

In this chapter, research designs and methods used for the development of the Tenant Office Space (TOS) framework were discussed. The chapter began with the discussion of the Preliminary part of the study. It discussed the Delphi Method which was used to identify the relevant factors for office occupation in the context of Kuala Lumpur. Then the Main part of the study was discussed. Firstly, the methods adopted to reduce the number of factors, which are the Principal Component Analysis (PCA) and the Importance Index (II), were described. Secondly, the chapter described the AHP method which was used to find the relative importance of the factors that were reduced in the first phase of the Main Study. It also discussed the ways that the assessment of the differences of the weights was made. The reliability and validity of the instruments were then discussed which led to the development of the TOS framework. The construction of the TOS framework starts with the identification of the measures for the criteria and the relative weights derive from the different tenants sectors. Finally, the validation of the framework was then discussed.

CHAPTER 6

RESULTS AND ANALYSIS

6.1 INTRODUCTION

This chapter presents the data analysis and results for the preliminary study followed by the two (2) phases of the main study. In the preliminary study, the result entails the use of Delphi method to establish experts' selection of relevant factors that influenced office occupation decision making within the city centre of Kuala Lumpur, Malaysia.

The experts survey had resulted in the selection of sixty (60) important office occupation factors in Malaysia. These were subsequently reduced to twenty-six (26) through a tenants' survey. In pursuing this aim of factor reduction, the study also drew from the findings of an earlier work on the classification of office buildings in Malaysia (Daud *et al*., 2011; Adnan *et al*., 2009). The matrix measurement formed the measurement of the proposed tenant office space (TOS) framework.

This research also employed the techniques of Principal Components Analysis (PCA), Importance Index (II) and Analytic Hierarchy Process (AHP). PCA and Importance Index worked on the sixty (60) office space occupation factors to reduce them to twenty six (26) most important ones based on the output from a tenants survey. The factors were then subjected to AHP analysis, which performed the calculation of the relative weights for the various factors in order to lead to the development of tenant office occupation decision criteria in this study. From the results of the AHP, the tenant office space (TOS)

framework was developed. This framework served as a guide to determine suitability among three selected tenant groups.

This chapter is structured as follows. Section 6.2 provides the results and data analysis of the preliminary stage of the study. Sections 6.3 present the results of the survey for classification of tenants organisations. Section 6.4 presents the results and data analysis of the first phase of the main study; while Section 6.5 presents the results and data analysis of the second phase of the main study. Section 6.6 provides the discussion on the application of AHP to the TOS framework. Section 6.7 provides the limitation of the TOS framework; while Section 6.8 presents the TOS framework validation. Finally, Section 6.9 provides the summary of the chapter.

6.2 RESULTS AND DATA ANALYSIS OF THE PRELIMINARY STUDY

This section presents the results of the preliminary study which reveal the important factors for office occupation within the Malaysian context. The sub-sections cover the data analysis of the results and the selection of the factors through the application of Delphi Method.

6.2.1 Data Analysis of Preliminary Study – Delphi Method

6.2.1.1 Participation of Experts in Delphi Method

As indicated in Section 5.3.1.1 (f), forty (40) experts were invited to participate in the Delphi exercise, which saw 27 experts responding in the first round and 20 in the second.

This recorded moderate levels of participation at 68% for the first round and 74% in the subsequent second round.

6.2.1.2 Analysis and Discussion

Using the Delphi technique, the panels' selections of the importance of the identified factors (from Sections 3.7.1 to 3.7.4) are tabulated in Appendix F. These selections illustrate the outcomes of the factors selected by the panels after two rounds of the exercise. During the first round, the panellists were asked to rate the importance of factors within each office occupation decision area of interest, namely the financial/cost, location, lease features and building elements' considerations. The exercise then proceeded into the second round, with the result that the findings from the earlier round were maintained since no further changes were noted in experts' responses in this later round. Table 6.1 presents the results of the important factors randomly selected for discussion purpose.

Table 6.1: Summary of the Descriptive Statistics for the Selected Important Factors under Delphi

Office occupation factors of influence	Mean	Mode	Standard Deviation
1. Location			
1. Branding/Image	4.3	4.0	0.6
2. Access to Amenities	4.3	4.0	0.6
3. Accessibility to Public Transportation & Terminal	4.1	4.0	0.7
4. Traffic Conditions	4.1	4.0	0.7
5. Level of Criminal Rate	4.0	4.0	1.1
2. Lease Features			
1. Renewal Terms	4.4	5.0	0.6
2. Length Lease	4.4	4.0	0.6
3. Termination Clause	4.1	4.0	0.8
3. Building Features, Services & Management			
1. Security & Access Control	4.6	5.0	0.5
2. Responsible Management & Maintenance Team, e.g. Responsive	4.6	5.0	0.5
3. Car Park Provision & Accessibility	4.5	5.0	0.6
4. Building Image/Identity	4.5	4.0	0.6
5. Modern IT & Communication Systems, e.g. broadband, wireless	4.1	5.0	0.8
4. Monetary Consideration			
1. Rental Rate	4.8	5.0	0.5
2. Total Occupancy Cost	4.4	5.0	0.7
3. Cost of Fit Out	4.3	5.0	0.8

(Source: this study, 2010)

The following observations can be made about the findings:

The importance of Location

Under location, the five factors that have been rated as most important by the experts are image/branding of the location, access to amenities, accessibility to public transport and terminals, traffic condition and level of crime. On the other end, factors of lesser importance are production cost (due to travelling cost) and access to raw materials and semi-finished products. Considering the predominantly service-oriented nature of the businesses in the central business district, it is to be expected the observation that the responses by panels are in tandem with of the factors highlighted earlier in the literature which suggest that the location factors are considered important in relation to the agglomeration economies which include the accessibility factors. However, the

agglomeration benefits diminish as the centre grows and traffic conditions have become a concern.

The importance of Lease Features

Under lease features, the panel of experts picked renewal terms, length of lease and termination clause as the three (3) most important. In explaining this finding, it is reasonable to surmise that security of occupation is very important to tenants as they seek to secure a stable environment for their business activities in the long-run.

The importance of Building Features, Services and Management

Under building features, services and management, the top five (5) important factors are: responsible management and maintenance team, security and access control, car park provision and accessibility, building image and identity, and modern IT and communication systems. With the responses given highlighting the building offering, it can be said that the important factors relate to the provision of top quality services and image that serve to support the activities of the tenants.

The importance of Economic/Monetary Consideration

Under the economic/monetary consideration, the top three (3) factors are rental rate, total occupancy cost and cost of fit-out. The responses highlight the experts' views about the economic aspects as important facets of tenant considerations - aspects that would be decisive in their final choice of office space.

6.2.1.3 Importance Index (II) Ranking

To complement descriptive statistics in the analysis of the Delphi method so as to arrive at a comprehensive array of factors relevant for their inclusion in the final selection list, this research had adopted the importance index rating. In this study, the importance index scores were determined from the experts' selection list. Table 6.2 depicts the sixty (60) most important factors that were scored 70 and above.

Table 6.2: Ranking of Important Factors by Experts

Rank	Office occupation factors	Importance Index
1	Rental Rate	96.3
2	Car Park Provision & Accessibility	94.8
3	Responsible management and maintenance team, e.g. responsive	94.1
4	Security and Access Control	93.3
5	Modern IT and Communication System, e.g. wireless, broadband	89.6
6	Building Identity/Image	89.6
7	Air-conditioning & Ventilation Systems	88.9
8	Fire Prevention & Protection	88.9
9	Renewal terms	88.9
10	Electrical Systems & Provision	88.1
11	Total Occupancy Cost	88.1
12	Length Lease/Duration of Contract	87.4
13	Comfortable and Secure Working Environment	86.6
14	Flexible Space Layout and Large Floor Plate Size	86.6
15	Maintenance Policy	86.6
16	Cost of Fit Out	86.6
17	Building Visibility	85.9
18	Image/Branding of Location	85.9
19	Access to Amenities	85.1
20	After Hours Operations	84.4
21	Space Efficiency	84.4
22	Accessibility to Public Transport & Terminal	83.7
23	View	83.7
24	Column Layout and Sub divisibility	82.9
25	Toilet and Sanitary Services	82.9
26	Modern Prestigious Building	82.9
27	Design of Entrance and Foyer	82.9
28	Termination Clause	82.9
29	Entrance/Foyer Accessibility	82.9
30	Building wayfinding, e.g. signage	82.9
31	Building Automation and Energy Management Systems	82.2
32	Safety Policies and Procedures	82.2
33	Cleaning/Housekeeping Services	82.2
34	Payment of Monies e.g. rental, deposit	82.2
35	Traffic Condition	81.4

36	Passenger Lift Performance and Control	81.4
37	Quality & Presentation of External Finishes	80.7
38	Architectural design and building finishes	80.7
39	Level of Criminal Rate	80.7
40	Floor Ceiling Height	80
41	Accessibility by private vehicles	80
42	Food and Beverage Outlets	80
43	Alteration and Renovation Clause	79.2
44	Incentives e.g. rent free period	79.2
45	Availability of Space for Future Expansion	77.7
46	Orientation of Office Space	77.7
47	Underfloor Trunking	77.7
48	Control of Building Services, e.g. M & E Services	77.7
49	Ease of Entrance Usage and capacity	77.7
50	Proximity to Clients/market, e.g. face-to-face contact	76.2
51	Compliance to Law & House Rules	75.5
52	Access to market	74.8
53	Age of building	74.0
54	Adequacy of Good Access & Circulation feature	74.0
55	Proximity to Support Services eg banks, postal etc.	73.3
56	Building Size	71.8
57	Repair and Insurance	71.8
58	Access to Skilled Labour	71.8
59	Proximity to major trunk roads	71.8
60	Energy Efficient/Green Buildings	71.1

(Source: this study, 2010)

The result reveals that there are varying degrees of importance placed on the various identified factors. Although rental rate emerges as topmost in importance, factors under the location and physical features of the office space offering are placed immediately after. By choosing the factors that have a relatively high index and adopting 70% as the threshold score, an itemisation of the important factors can be performed. This resulted in the selection of sixty (60) most important factors out of the original 128 identified from the literature survey. Table 6.3 presents that itemisation categorised according to the respective categories of office occupation consideration.

Table 6.3: Main Areas and Factors

Main Area	Factors
Financial/Cost	1. Rental Rate 2. Total Occupancy Cost 3. Cost of Fit Out
Location	1. Image/Branding of Location 2. Access to Amenities 3. Accessibility to Public Transport & Terminal 4. Traffic Condition 5. Level of Criminal Rate 6. Accessibility to Private Vehicles 7. Proximity to Clients/market e.g. face-to-face contact 8. Access to Market 9. Proximity to Support Services, e.g. banks, postal 10. Access to skilled labour 11. Proximity major trunk roads
Lease	1. Renewal terms 2. Length lease/duration of contract 3. Termination Clause 4. Payment of Monies terms e.g. rent, service charge 5. Alteration & renovation clause 6. Incentives e.g. rent free period 7. Compliance to Law & House Rules 8. Repair & Insurance terms
Building	1. Car Park Provision & Accessibility 2. Responsible Management and Maintenance Team e.g. responsive 3. Security & Access Control 4. Modern IT & Communication Systems e.g. broadband, wireless 5. Building Identity/Image 6. Air-Conditioning & Ventilation Systems 7. Fire Prevention & Protection 8. Electrical Systems & Provision 9. Comfortable and Secure Working Environment 10. Flexible Space Layout and Large floor plate 11. Maintenance Policy 12. Building Visibility 13. Entrance/Foyer Accessibility 14. After Hours Operations 15. Space Efficiency 16. View 17. Column Layout & Sub divisibility 18. Toilet & Sanitary Services 19. Modern Prestigious Building 20, Design of Entrance & Foyer 21. Building Way Findings, e.g. signage 22. Building Automations & Energy Management Systems 23. Safety Policies & Procedures 24. Cleaning/Housekeeping Services 25. Passenger Lift Performance & Control 26. Quality & Presentation of External finishes 27. Architectural Design & Building Services 28. Floor Ceiling Height

	29. Food & Beverage Outlets 30. Availability of Space for Future Expansion 31. Orientation of Office Space 32. Underfloor Trunking 33. Control of Building Services, e.g. M & E Services 34. Ease of Entrance Usage & Capacity 35. Age of Building 36. Adequacy of Good Access and Circulation 37. Building Size 38. Energy Efficient/Green Buildings Features

(Source: this study, 2010)

6.3 RESULTS OF SURVEY FOR THE CLASSIFICATION OF TENANT ORGANISATIONS

Survey forms were distributed to sixty-one (61) office building managers in the study area. Responses were received in respect of forty-five (45) buildings while information was not available for the remaining sixteen (16), as their managers did not supply the details as requested. Therefore, an approximation of the space occupied by the tenant organisations' categories was made based on on-site directory listings or through enquiries made with property agents marketing the office space. The breakdown of the space occupied by tenant organisations within the defined categories (MSIC, 2008 definition) is as follows:

Table 6.4: Breakdown of Tenant Organisations by Activity

No	Category of activities (as in MSIC, 2008 definition)	% of office space occupied
1	Banking and Other Financial activities	17.9%
2	IT, Communication & Media	13.5%
3	Oil and Gas (Mining)	13.1%
4	Professional & Scientific	12.3%
5	Other Services & commercial	12%
6	Administrative & Support	9.6%
7	Government Sectors	8.5%
8	Manufacturing & Transportation	5.9%
9	Real Estate & Construction	5.7%
10	Education	1.5%

(Source: this study, 2010)

From this initial data gathering of the tenant organisations, a list of addresses was also compiled for the distribution of questionnaire as described in Section 5.3.3.2 (d).

6.4 RESULTS AND DATA ANALYSIS OF THE MAIN STUDY – PCA AND IMPORTANCE INDEX

This section of the chapter presents and discusses the data analysis and results of the main part of the study. The first phase of the main study discusses the data analysis and results of the two methods adopted to reduce the factors to a number manageable for AHP analysis. Two methods were identified to achieve the objective. First, the dataset was treated using the Principal Components Analysis to select the factors. The result was then compared against the list of factors that have been obtained using the Importance Index approach. The two were reconciled to a final selection of the variables to be used as criteria in the AHP. Section 6.4.1 presents the data collection results. The respondents' profile is examined in Section 6.4.2.

6.4.1 Data Collection Results

A total of 1,127 questionnaires were distributed. Table 6.5 shows the breakdown of the number of respondents who completed the questionnaire based on the data for the various collection approaches.

Table 6.5: Response Rate of Usable Answered Questionnaire Survey

Method of Data Collection	Total No Distributed	Adjusted Number (updated)	Received	Usable	Response Rate-Usable Questionnaire (%)
Enumerators	200	75	35	33	6.5%
Direct Mail	720	247	67	63	12.5%
Self Delivered/Email	207	180	83	83	16.5%
Total	1127	502	185	179	35.6%

Of the original total of 1,127 distributed, some survey forms were returned undelivered for failing to reach the target respondents. Possible causes were that the premises were vacant or that the occupants were owner-occupiers. This was borne out in the information received from occupiers of many office buildings who stated that most of the units in their buildings are owner-occupied, with few units being let out. The tenant list gathered from the office buildings' directories was further updated and monitored for the responses to be used in the survey. Table 6.5 shows that the self-delivered/email data collection mode yielded the highest response rate at 16.5%. The mailing method produced a comparatively lower response rate of 12.5%. In all, 185 questionnaires were received out of the possible total of 502 to post an overall return rate of 36.8%. Since a small portion of the received questionnaires was unusable due to some uncompleted sections, the number of usable ones was slightly less at 179 (35.6%). This rate is acceptable given that some other real estate studies have responses that fall between 14% and 31.7% (McDaniel & Louargand, 1994; Nelson & Nelson, 1995; Seiler *et al*., 2000).

6.4.2 Profile of the Respondents

The respondents' profiles covered both a summary of their business and general information about them, as shown in Table 6.6. The table depicts the respondents' profiles in terms of their nature of business, staff strength, size of occupied space, and years of building occupation as tenants.

Table 6.6: Profile of Respondents

	Percent of respondents (%)
Nature of Business	
Banks, finance & Insurance company	*18*
IT, Communication & Advertising	*16*
Construction & Real Estate	*10*
Professional, Scientific & Technical	*19*
Admin & Other Support Services	*10*
Oil & Gas	*10*
Other Service Activities	17
Staff strength	
< 5	
5 to 19	*10*
20 to 50	*34*
51 to 150	*20*
> 150	*15*
	21
Size of Space (sq. ft.)	
500	*1*
500 to 1000	*12*
1001 to 4999	*47*
5000 to 9999	*16*
10000 to 49999	*16*
>50000	8
Years of Building Occupation as Tenants	
< 2 years	*19*
2-3 years	*9*
3-5 years	*12*
5-10 years	*36*
> 10 years	*24*

(Source: this study, 2010)

It can be observed that there was an almost even representation of responses from each different sector. The highest percentage was from the professional, scientific and technical sector while the lowest percentage was from the oil and gas sector. When staff strengths in these organisations were compared, the highest percentage was from organisations with 5 to 19 staff numbers while the lowest percentage was from organisations with fewer than 5 staff. In terms of the space occupied, the highest percentage was from organisations that occupy between 1,001 and 4,999 square feet. However, the percentages of organisations

that occupy above 5,000 square feet of space totalled 30% and represented the grouping from where a substantial amount of responses came. Finally, it can be observed that more than 50% of the respondents have been tenants for more than 5 years. This is desirable for this study because it ensures a high proportion of respondents who have the adequate tenancy experience to be able to choose the factors that are important to office occupation decisions.

6.4.3 Factor Reduction Exercise (Principal Component Analysis and Importance Index)

Principal Component Analysis was performed on the sixty factors selected by the experts, as in Section 6.2.1. While keeping each factor under its respective main area, the principal component extraction method and varimax rotation were used. By applying the methods on the attributes under each main area, the summaries of the findings are as shown in Tables 6.7, 6.8, 6.9 and 6.10.

Table 6.7: Office Occupation Factors - Location

A. Main: Location	**Factors**		
Cronbach's Alpha : 0.817 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.773*			
	1	**2**	**3**
Access to Amenities	0.827		
Access to Market	0.713		
Branding/Image/Prestige	0.706		
Proximity to other support services	0.684		
Access to Skilled Labour	0.574		
Proximity to Clients/market	0.503		
Accessibility to Public Transport & Terminal		0.834	
Accessibility to Private Vehicles		0.783	0.335
Proximity to major Trunk Roads/Highways		0.673	
Traffic Congestion			0.868
Level of Criminal Rate			0.824

Table 6.8: Office Occupation Factors - Lease

B. Main: Lease	**Factor**
Cronbach's Alpha : 0.936 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.914*	
	1
Termination Clause	0.886
Payment of Monies	0.877
Alteration and Renovation	0.840
Compliance to law and house rules	0.834
Repair and Insurance Clause	0.829
Length Lease	0.810
Renewal Terms	0.808
Incentives	0.774

Table 6.9: Office Occupation Factors – Financial/Cost

C. Main: Financial/Cost	**Factor**
Cronbach's Alpha: 0.906 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.716*	
	1
Cost of Fit Out	0.945
Total Occupancy Cost	0.938
Rental Rate	0.871

Table 6.10: Office Occupation Factors - Building

D. Main: Building	**Factors**				
Cronbach's Alpha: 0.891 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.917*					
	1	**2**	**3**	**4**	**5**
Flexible space layout & large floor plate	0.825				
Column Layout & Subdivisibility	0.825				
Floor – Ceiling Height	0.786				
Orientation of Office Space	0.784				
Space Efficiency	*0.780*				
Building Size	0.749				
View	0.738				
Underfloor Trunking	0.731		0.344		
Comfortable & Secure Working Environment	0.716				
Energy Efficient/Green Building	0.667				
Availability of Space for future expansion	0.641		0.367		
Responsible management & maintenance team		0.864			
Safety Policies & Procedure		0.861			
Security & Access Control		0.856			

Cleaning/HouseKeeping Services		0.833			
Maintenance Policy		0.816			
Fire Prevention & Protection		0.815			
After Hours Operations		0.610			
Quality & Presentation of External Finishes			0.859		
Modern Prestigious Building			0.838		
Building Visibility			0.805		
Building Identity/Image			0.800		
Architectural Design & Building Finishes		0.400	0.735		
Design of Entrance and Foyer		0.365	0.719		
Age of Building		0.385	0.711		
Electric System & Provision				0.800	
Building Automation & Energy Management Systems				0.776	
Modern IT & Telecommunication Systems		0.331		0.768	
Control of Building Services				0.761	
Air Conditioning & Ventilation		0.382		0.754	
Toilet, Sanitary & Facilities		0.359		0.720	
Car Park Provision & Accessibility					0.778
Adequacy of Good Access & Circulation Features		0.334			0.770
Passenger Lifts Performance and Control					0.738
Building Wayfinding					0.723
Ease of Entrance Usage & Capacity					0.614
Food and Beverage					0.378
Entrance/Foyer Accessibility					0.152

To identify the factors that reflect the components identified under each area, the matrices were rearranged. With the rearrangement, only the factors that have high loading values were included. This is summarised in Table 6.11.

Table 6.11: Extracted Factors (rotated matrix) - Location

A. Main: Location	**Factors**		
Cronbach's Alpha : 0.817 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.773*			
	1	**2**	**3**
Access to Amenities	0.827		
Accessibility to Public Transport & Terminal		0.834	
Traffic Congestion			0.868
Level of Crime			0.824

Table 6.12: Extracted Factors (rotated matrix) – Lease

B. Main: Lease	**Factor**
lesCronbach's Alpha : 0.936 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.914*	
	1
Termination Clause	0.886
Payment of Monies	0.877
Alteration and Renovation	0.840
Compliance to law and house rules	0.834
Repair and Insurance Clause	0.829
Length Lease	0.810
Renewal Terms	0.808

Table 6.13: Extracted Factors (rotated matrix) – Financial

C. Main: Financial	**Factor**
Cronbach's Alpha: 0.906 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.716*	
	1
Cost of Fit Out	0.945
Total Occupancy Cost	0.938
Rental Rate	0.871

Table 6.14: Extracted Factors (rotated matrix) – Building

D. Main: Building	**Factors**				
Cronbach's Alpha: 0.891 *Bartlett's test of sphericity : 0.000* *Kaiser-Meyer-Olkin measure of sampling adequacy : 0.917*					
	1	**2**	**3**	**4**	**5**
Flexible space layout & large floor plate	0.825				
Column Layout & Subdivisibility	0.825				
Responsible management & maintenance team		0.864			
Safety Policies & Procedure		0.861			
Security & Access Control		0.856			
Cleaning/HouseKeeping Services		0.833			
Maintenance Policy		0.816			
Fire Prevention & Protection		0.815			
Quality & Presentation of External Finishes			0.859		
Modern Prestigious Building			0.838		
Building Visibility			0.805		
Building Identity/Image			0.800		
Electric System & Provision				0.800	
Car Park Provision & Accessibility					0.778

Since the minimum acceptable level for Cronbach's alpha level is 0.7 (Nunnally, 1978), the values of 0.8 to 0.9 achieved in the analysis suggest that the responses received through the questionnaire were reliable. Further, the Bartlett's test of sphericity on each main area showed readings that were significant at 5% level, while KMO recorded values of 0.8 to 0.9 to confirm the adequacy of correlation between the factors in order to apply the principal component analysis.

6.4.3.1 Analysis of PCA

It can be observed that the factors under the main areas of Lease features and Financial considerations have only one explained factor. However, the attributes under the main areas of Location and Building have more than one factor explained. This suggests the various underlying dimensions that the factors are measuring. For location, the three (3) factors can be described as Agglomeration, Accessibility and Environment. The attributes identified under each factor however can be easily identified to represent the location criteria. Under the Building features, there are five (5) factors which can be described as Space Provision, Management, Features, Services, and Accessibility & Convenience. Should the attributes under each factor be grouped under one common name, they can easily be distinguishable to represent the Building elements. With the identified factors under each heading to be selected for the MCDM analysis, another form of identification of the important factors is made by means of the Importance Index approach.

6.4.3.2 Analysis of Importance Index Ranking

Table 6.15 shows the result of the importance index ranking. All the factors were listed in descending rank order based on the importance index. The results of the factors that have achieved importance index higher than 80 (representing the appropriate numbers of factors to be used in AHP) are as in Table 6.15 below.

Table 6.15: The Ranking of Factors by Importance

Main Area	Factor	Importance Score	Rank
Financial	- Rental Rate	89.0	1
	- Total Occupancy Cost	85.0	2
	- Cost of Fit Out	83.6	3
Location	- Image/Branding of Location	83.3	1
	- Access to Amenities	83.2	2
	- Level of Criminal Rate	82.8	3
	- Accessibility to Public Transportation and Terminal	82.6	4
	- Access to Market	82.2	5
Lease Features	- Payment of Monies	81.1	1
	- Termination Clause	81.1	1
Building Features, Services	- Fire Prevention & Protection	91.1	1
	- Security & Access Control	91.0	2
	- Safety Policies & Procedures	90.8	3
	- Air-Cond & Ventilation Systems	90.4	4
	- Responsible Management and Maintenance Team	90.3	5
	- Electric System & Provision	90.2	6
	- Toilet & Sanitary Services	88.9	7
	- Modern IT & Communication Systems	88.5	8
	- Cleaning/House Keeping	88.5	9
	- Maintenance Policy	88.1	10
	- Car Park Provision & Accessibility	85.7	11
	- Control of Building Services	85.4	12
	- After Hours Operations	84.8	13
	- Building Automation	84.6	14
	- Building Way finding	82.7	15
	- Passenger Lift Performance & Management	81.1	16

(Source: this study, 2010)

The results show that the factors under Building have generally achieved higher scores compared to those under Financial Consideration. This is contrary to the literature and findings from past research on building elements for quality consideration in Malaysia, which found that the design and space consideration aspects had not been given a high priority by stakeholders (Adnan *et al*., 2009). A possible explanation is that this reflects the fact that the office buildings selected in this study are prime high-rise office buildings with high concerns for the safety, security and convenience of tenant operations. Since the financial aspects were also thought to be of concern, the rental rate also materialised as one of the most highly ranked factors. The location attributes have an almost similar ranking range, which relates to the fact that all the office buildings indicated in the study are located in the central business district (CBD). With the selection of the important factors that have score of more than 80 and comparing the factors that have been selected from the PCA method, the summary of the important criteria are shown in Table 6.16.

Table 6.16: Importance Index Ranks

Main Criteria	Sub Criteria	Important Index Rank by Main Criteria	PCA high loading
Financial	- Rental Rate	1	0.87
	- Total Occupancy Cost	2	0.93
	- Cost of Fit Out	3	0.94
Location	- Image/Branding of Location	1	0.71
	- Access to Amenities	2	0.82
	- Level of Criminal Rate	3	0.82
	- Accessibility to Public Transportation and Terminal	4	0.83
	- Access to Market	5	0.71
Lease Features	- Payment of Monies	1	0.88
	- Termination Clause	2	0.88
Building Features, Services	- Fire Prevention & Protection	1	0.82
	- Security & Access Control	2	0.86
	- Safety Policies & Procedures	3	0.86
	- Air-Cond & Ventilation Systems	4	0.75
	- Responsible Management and Maintenance Team	5	0.86

	- Electric System & Provision	6	0.80
	- Toilet & Sanitary Services	7	0.72
	- Modern IT & Communication Systems	8	0.77
	- Cleaning/House Keeping	9	0.83
	- Maintenance Policy	10	0.82
	- Car Park Provision & Accessibility	11	0.78
	- Control of Building Services	12	0.76
	- After Hours Operations	13	0.61
	- Building Automation	14	0.77
	- Building Way finding	15	0.72
	- Passenger Lift Performance & Management	16	0.74

(Source: this study, 2010)

In drawing together the results from PCA and the Importance Index to arrive at final selection of the factors, greater reliance was placed on the latter. This is due to fact that the number of respondents for the PCA method does not meet the conditions of minimum sample size as recommended by Hair *et al*. (2006), or Garson (2008) although there are studies that have used smaller samples than recommended. It has been observed by Costello and Osborne (2003) through a survey of 1,076 journal articles utilising PCA or EFA in psychology that 40.5% of peer-reviewed, published studies utilised less than a 5:1 subject to item ratio, and 63.2% utilised 10:1 or under. Although this is the case, for the purpose of this study, PCA is still an acceptable method and is used for factor reduction along with the use of Importance Index; these being the main factor reduction method.

This has meant that some factors which had earlier been excluded by PCA were accepted into the final output on the grounds that such factors ranked high on Importance Index. Conversely, there were some factors that scored high on loading values in PCA but were excluded for being low on Importance Index score. In any event, it was also ensured that only those factors with a loading value of more than 0.6 were to enter the final selection. In

general, the factors that were given high priority relate to building management and services. The final selected list of factors is presented in Table 6.16.

6.5 RESULTS AND DATA ANALYSIS OF THE MAIN STUDY - ANALYTIC HIERARCHY PROCESS (AHP)

After the factor reduction exercise (as in the previous section, 6. 4), the Analytic Hierarchy Process was conducted to determine the relative weights of the main criteria and sub criteria (redefined from areas and factors as explained in Section 5.3.3.3(a)). AHP is used in the determination of the preference for office space by the selected tenants sectors, i.e. Banking/Finance, ICT & Media and Oil & Gas. Out of the sixty (60) tenants invited to participate in the AHP exercise, only 28 responses were received to enable further AHP operation. The profile of the twenty eight (28) respondents in the AHP exercise is shown in Table 6.17.

Table 6.17: Breakdown of Tenants' Respondents' Profile for AHP

Sector	Banking/Finance	ICT & Media	Oil & Gas	Total
No of Tenants with Turnover < RM5 Million	5	5	6	16 (small)
No of Tenants with Turnover > RM5 Million	5	4	3	12 (large)
Total	10	9	9	28
No of Staff (< 50)	6	5	6	17
No of Staff (> 50)	4	4	3	11
Total	10	9	9	28
Years established (> 5 years)	10	9	9	28
Total	10	9	9	28

(Source: this study, 2010)

The tenants who participated in the AHP operation comprise large and small organisations within the definition of Small and Medium Enterprises Development Corporation (SMECORP), Malaysia. This study has adopted the definition encompassing the turnover

of the organisation, as the definition of full-time employees may not be accurate for certain organisations (see Section 5.3.3.3 (b)).

The following steps were conducted to derive the final weights in the development of the Tenant Office Space (TOS) framework.

6.5.1 Determining the Normalised Weights

Pair-wise judgement matrices obtained from the twenty eight (28) evaluators comprising all the three (3) categories of tenants' groups (Finance/Banking, ICT & Media and Oil & Gas) in the measurement and data collection phase were combined using the geometric mean approach at each hierarchy level to obtain the corresponding consensus pair-wise comparison judgement matrices. Each of the matrices was then translated into the largest eigen value problem and was solved to find the normalised and unique priority weight for each criterion. The software system called Expert Choice™ was used to determine the normalised priority weights. The Expert Choice™ generates both global and local weights. In this study, the sub criteria weights refer to global weights. Local weights are used when the main criteria are used for comparison. An example of the Pair-wise Comparison Judgement Matrix (PCJM) from the Expert Choice™ view (from one of the finance sector evaluators comparison) is shown in Figures 6.1, 6.2, 6.3, 6.4 and 6.5. The consistency ratio (CR) for the whole model is shown in figure 6.6. The consistency ratio for the PCJM of the overall assessment of the organisations ranges from 0.0001 to 0.1. It can be seen that the consistency ratio of each of the PCJM is equal or less than 0.1, which implies that the evaluators are consistent in assigning pair-wise comparison judgements. The procedure was repeated with the individual tenants. Figures 6.8, 6.9, 6.10, 6.11 and 6.12 show the

overall ranking of each sub criterion (factor) for each tenant sector and size category. The comparison of the overall ranking between the three sectors and the large & small organisations is shown in Figures 6.13 and 6.14.

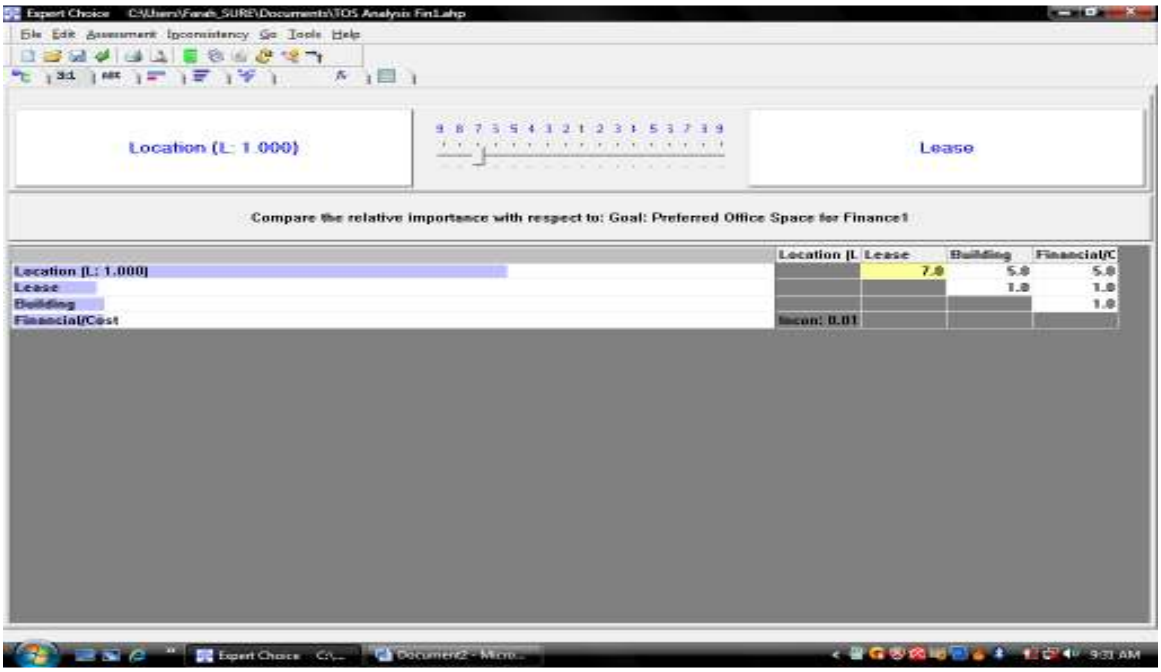


Figure 6.1 : Pair Wise Comparison for All Main Criteria

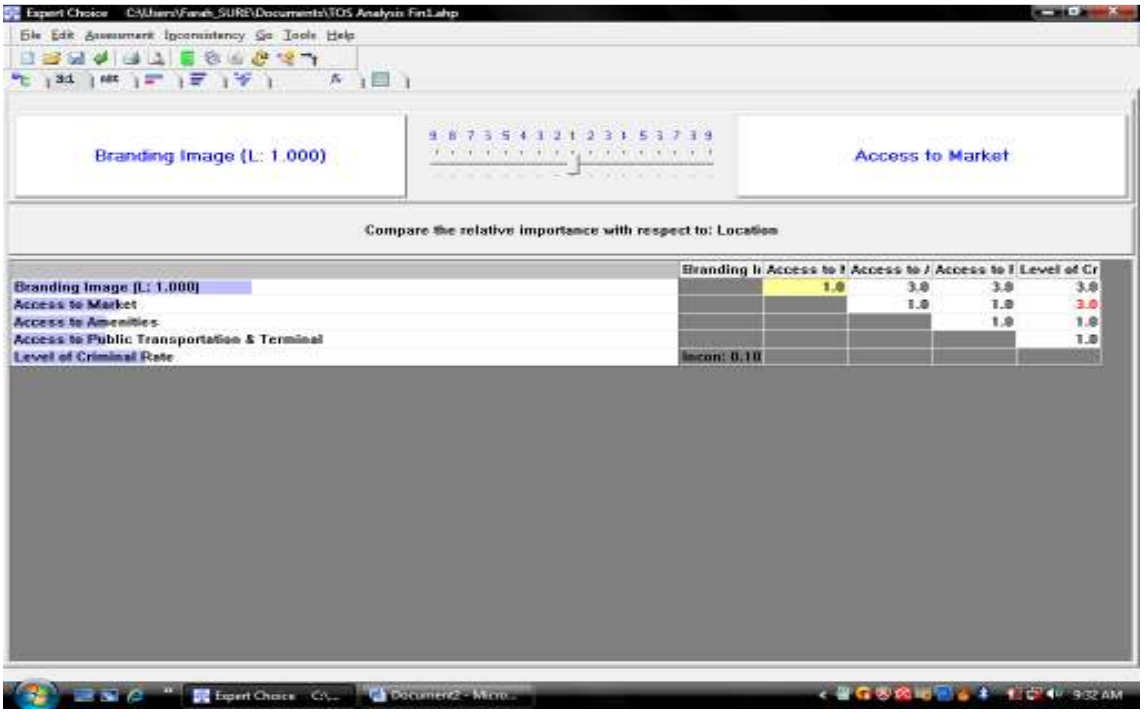


Figure 6.2 : Pair Wise Comparison for Location Sub Criteria

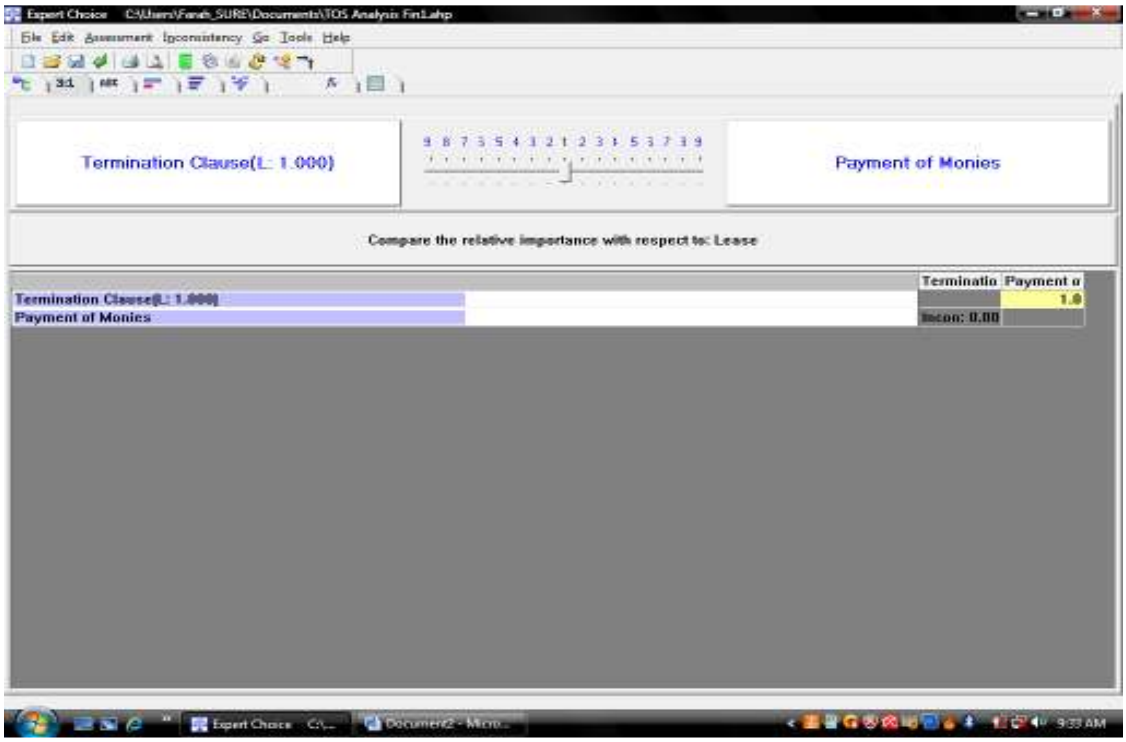


Figure 6.3 : Pair Wise Comparison for Lease Sub Criteria

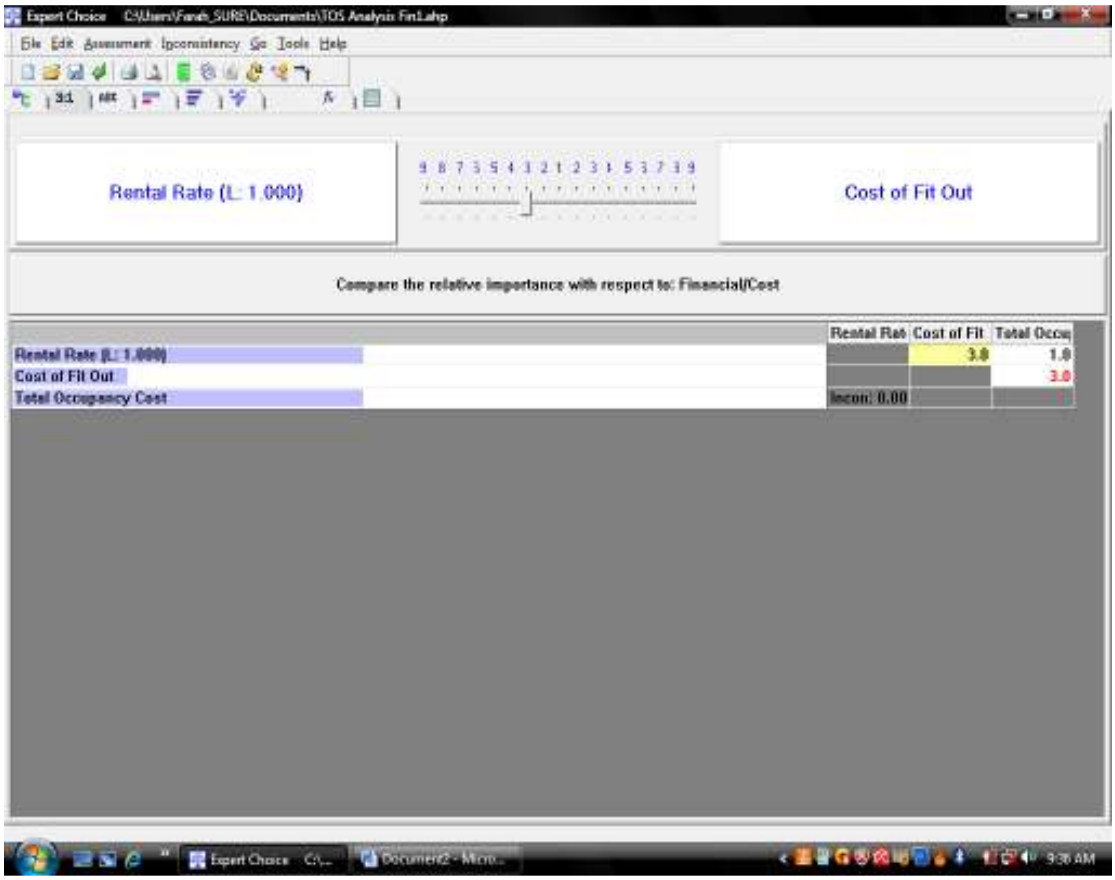


Figure 6.4: Pair Wise Comparison for Financial/Cost Sub Criteria

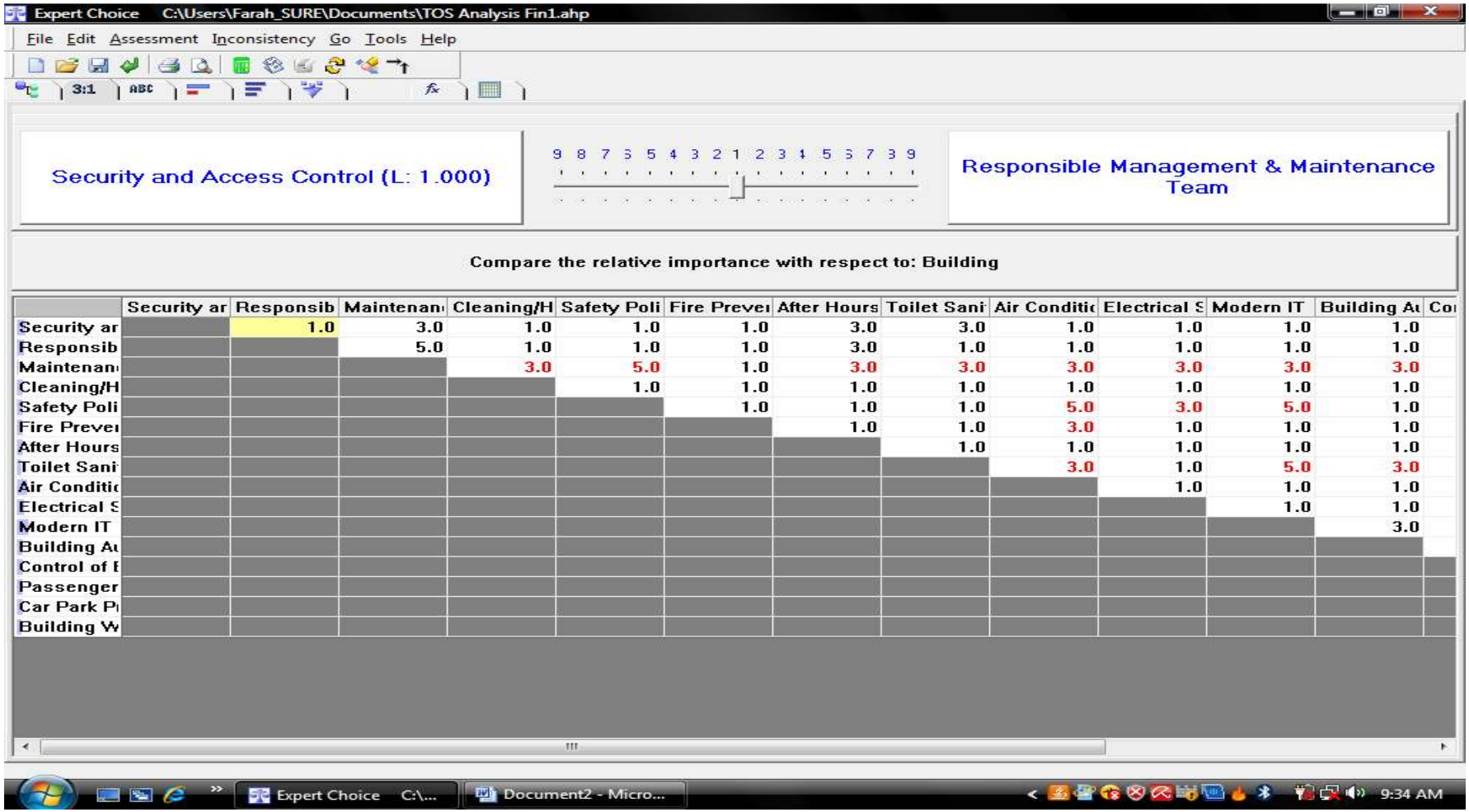


Figure 6.5 : Pair Wise Comparison for Building Sub Criteria (partial view from Expert Choice™)

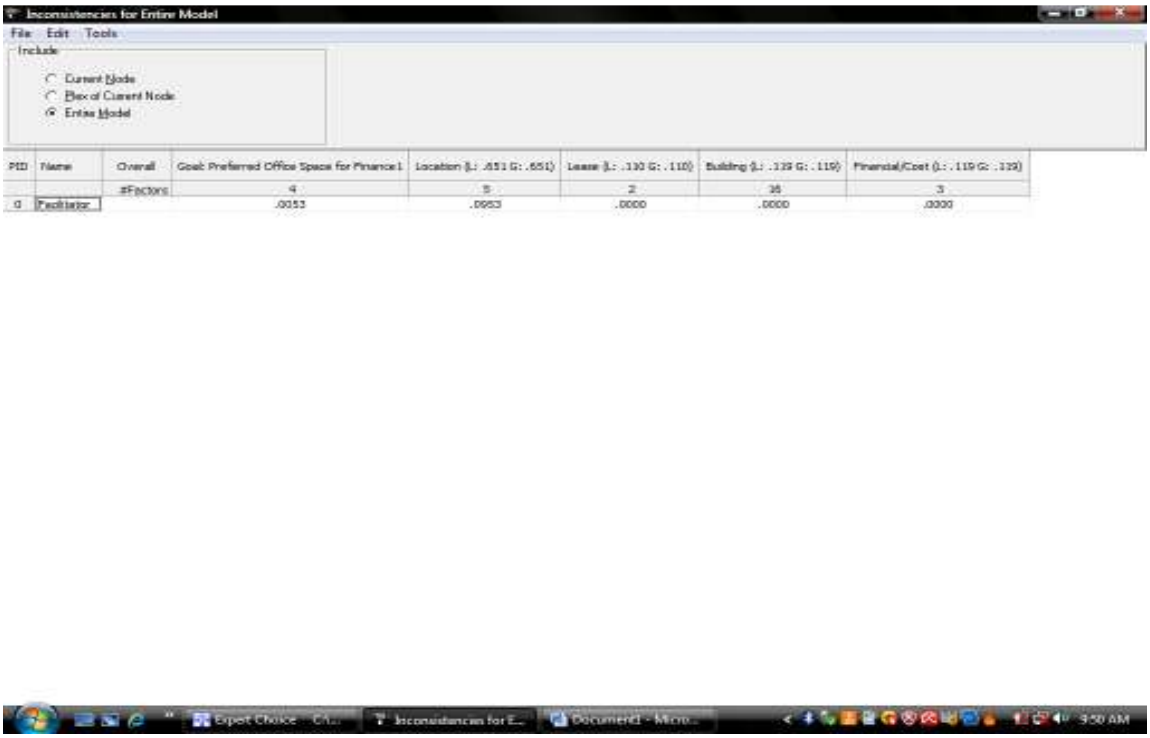


Figure 6.6 : The Expert Choice™ view of the Inconsistency Index for the Model

6.5.2 Synthesis – Finding a Solution to the Whole Problem

After computing the normalised priority weights for each PCJM of the AHP hierarchy, the next step was to synthesise the solution to the TOS preference problem. The normalized local priority weights of the main and sub criteria which have been obtained were combined with respect to all successive hierarchical levels to obtain the global composite priority weights of all criteria and sub criteria used in the AHP model. As explained earlier, the Expert Choice™ software system was used to determine these global priority weights. Saaty (1996) pointed out that if there are more than two levels, the various priority vectors can be combined into priority matrices, which yield one final priority vector for the bottom level. Local priority is the priority relative to its parent while global priority, also called the final priority, is the priority relative to the goal. The summary of the local and global

weights for all the criteria of one of the Finance/Banking evaluators (as extracted from Expert Choice™) is shown in Figure 6.7.

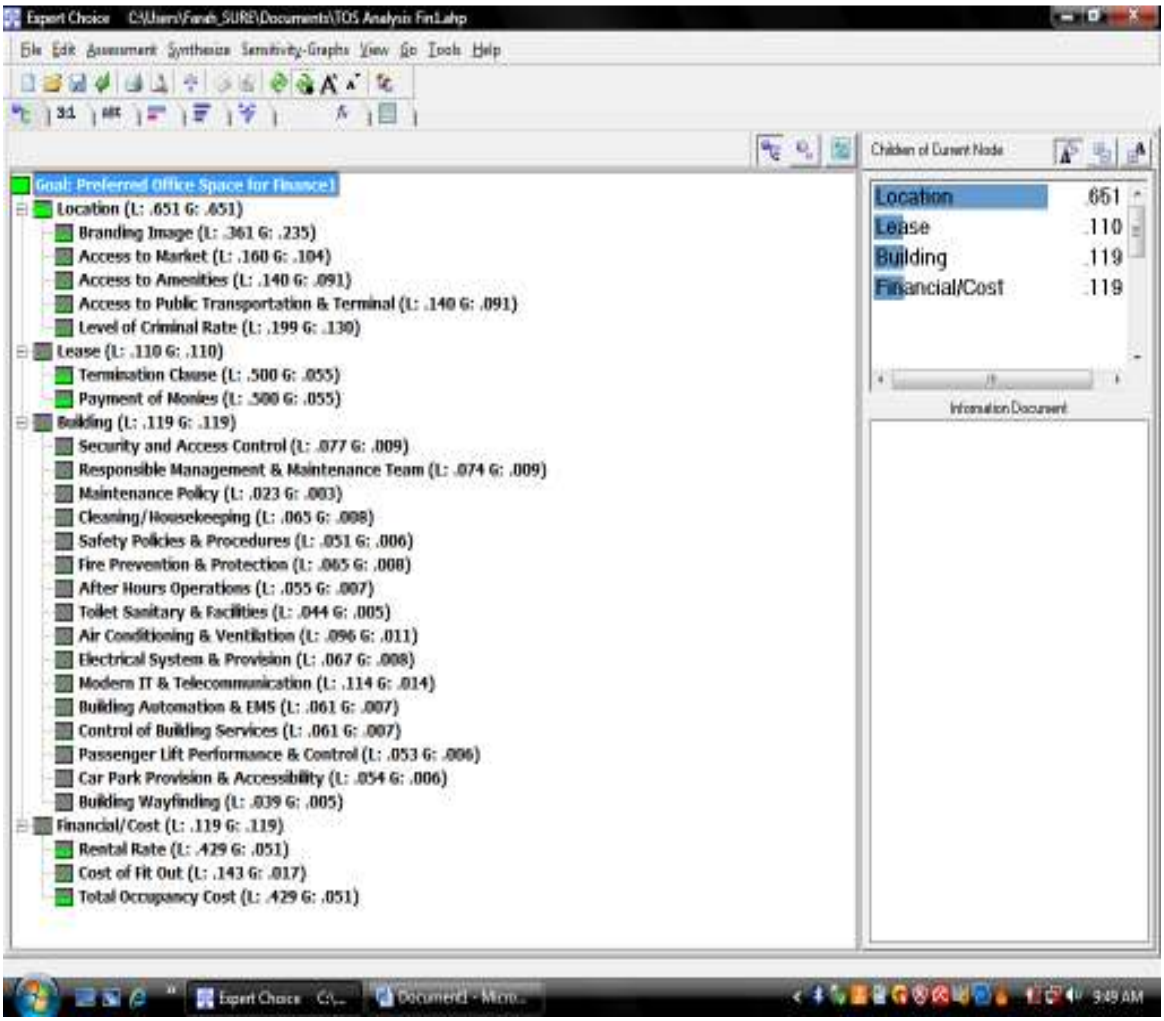


Figure 6.7 : The Global and Local Priority Weights for the Main and Sub Criteria - one of the Finance/Banking evaluators preference

After calculating the global weights of each criteria and sub criteria for each participant in the AHP procedure, the weights are tabulated as in Table 6.18.

As explained earlier, the AHP model was used to analyse the responses of the twenty eight (28) respondents for the office occupation decision making factors. The consistency ratios for all the Pair-wise Comparison Judgement Matrix (PCJM) were all equal to or under 0.1 which confirms the reliability of the criteria weights. The tenant sectors preference for each of the sub criteria can be observed through the global priority weights.

The overall group mean weight (sub criteria) in percentage for the three sectors (Finance/Banking, ICT & Media and Oil & Gas and the overall mean weight (sub criteria) in percentage for large and small organisations is shown in Tables 6.19 and 6.20. These means of the weights generated from each group will be used to represent the weight for the criteria as perceived by the respective group. Figure 6.8, 6.9 and 6.10 show the ranking of preference weights for each sub criteria for each of the tenant sector group. The ranking of the preference weights for each sub criteria for the tenant organisations according to the size is shown in Figures 6.11 and 6.12. The comparison of the ranking for each sub criteria between the three tenant sectors and size categories is shown in Figures 6.13 and 6.14.

Table 6.18: The Factors Weights from All Participants

Sub Criteria/Factors (Global Weights)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	ICT1	ICT2	ICT3	ICT4	ICT5
Branding Image	0.194	0.04	0.098	0.007	0.038	0.026	0.157	0.018	0.028	0.065	0.014	0.009	0.042	0.108	0.018
Access to Market	0.086	0.023	0.021	0.001	0.013	0.198	0.121	0.209	0.047	0.065	0.04	0.046	0.031	0.025	0.018
Access to Amenities	0.075	0.015	0.109	0.002	0.041	0.112	0.058	0.057	0.021	0.065	0.052	0.032	0.079	0.016	0.018
Access to Public Transportation & Terminal	0.075	0.063	0.156	0.002	0.055	0.072	0.039	0.093	0.006	0.065	0.072	0.049	0.052	0.01	0.018
Level of Criminal Rate	0.107	0.014	0.126	0.001	0.014	0.02	0.01	0.121	0.12	0.065	0.227	0.031	0.015	0.007	0.128
Termination Clause	0.033	0.017	0.111	0.031	0.106	0.037	0.091	0.045	0.015	0.065	0.023	0.046	0.073	0.019	0.094
Payment of Monies	0.033	0.002	0.111	0.004	0.015	0.037	0.03	0.006	0.015	0.065	0.07	0.046	0.073	0.019	0.094
Security and Access Control	0.024	0.016	0.007	0.044	0.025	0.012	0.002	0.01	0.072	0.016	0.018	0.003	0.017	0.016	0.022
Responsible Management & Maintenance Team	0.023	0.008	0.013	0.044	0.007	0.013	0.052	0.022	0.109	0.02	0.04	0.004	0.019	0.016	0.024
Maintenance Policy	0.007	0.01	0.003	0.044	0.039	0.022	0.067	0.006	0.112	0.014	0.016	0.004	0.014	0.016	0.022
Cleaning/Housekeeping	0.02	0.011	0.004	0.044	0.012	0.015	0.028	0.016	0.007	0.024	0.005	0.003	0.017	0.022	0.024
Safety Policies & Procedures	0.016	0.016	0.002	0.044	0.019	0.009	0.011	0.007	0.097	0.056	0.013	0.004	0.011	0.016	0.025
Fire Prevention & Protection	0.02	0.047	0.002	0.044	0.017	0.014	0.012	0.003	0.038	0.065	0.011	0.009	0.057	0.016	0.028
After Hours Operations	0.017	0.01	0.002	0.044	0.009	0.021	0.017	0.001	0.019	0.014	0.01	0.011	0.014	0.015	0.01
Toilet Sanitary & Fittings	0.014	0.024	0.006	0.044	0.009	0.017	0.015	0.021	0.015	0.039	0.005	0.006	0.041	0.016	0.024
Air Conditioning & Ventilation	0.03	0.036	0.019	0.044	0.011	0.014	0.015	0.004	0.017	0.031	0.011	0.007	0.045	0.016	0.024
Electrical System & Provision	0.021	0.038	0.035	0.044	0.013	0.009	0.015	0.003	0.029	0.021	0.009	0.01	0.047	0.016	0.024
Modern IT & Telecommunication	0.036	0.032	0.029	0.044	0.015	0.009	0.015	0.001	0.017	0.019	0.022	0.012	0.079	0.016	0.026
Building Automation & EMS	0.019	0.013	0.005	0.044	0.017	0.012	0.011	0.001	0.017	0.019	0.008	0.01	0.054	0.016	0.026
Control of Building Services	0.019	0.013	0.003	0.044	0.02	0.011	0.017	0.009	0.017	0.019	0.008	0.009	0.035	0.016	0.024
Passenger Lifts Performance & Control	0.016	0.019	0.006	0.044	0.025	0.016	0.01	0.017	0.017	0.027	0.008	0.007	0.047	0.016	0.026
Car Park Provision & Accessibility	0.017	0.026	0.018	0.044	0.03	0.011	0.011	0.004	0.014	0.031	0.027	0.01	0.049	0.016	0.024
Building Way finding	0.012	0.008	0.004	0.044	0.022	0.009	0.013	0.001	0.014	0.022	0.007	0.01	0.067	0.016	0.023
Rental Rate	0.036	0.163	0.085	0.085	0.14	0.104	0.142	0.095	0.112	0.029	0.076	0.207	0.012	0.177	0.115
Cost of Fit Out	0.012	0.129	0.015	0.085	0.176	0.028	0.026	0.022	0.016	0.01	0.033	0.207	0.002	0.177	0.018
Total Occupancy Cost	0.036	0.206	0.01	0.085	0.111	0.153	0.016	0.209	0.01	0.065	0.174	0.207	0.009	0.177	0.102
Total	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CR	0.005	0.095	0.006	0.081	0.099	0.084	0.091	0.093	0.003	0	0.0705	0.1	0.005	0.082	0.061

ub Criteria/Factors (Global Weights)	ICT6	ICT7	ICT8	ICT9	OG1	OG2	OG3	OG4	OG5	OG6	OG7	OG8	OG9
Branding Image	0.013	0.006	0.071	0.306	0.04	0.013	0.007	0.015	0.036	0.005	0.013	0.009	0.099
Access to Market	0.02	0.018	0.015	0.111	0.012	0.008	0.028	0.016	0.136	0.014	0.013	0.009	0.099
Access to Amenities	0.02	0.036	0.017	0.078	0.181	0.061	0.033	0.015	0.015	0.02	0.025	0.063	0.162
Access to Public Transportation & Terminal	0.028	0.015	0.023	0.035	0.071	0.061	0.044	0.205	0.123	0.042	0.024	0.07	0.103
Level of Criminal Rate	0.08	0.063	0.029	0.057	0.088	0.037	0.088	0.103	0.117	0.039	0.078	0.039	0.066
Termination Clause	0.024	0.021	0.02	0.115	0.091	0.006	0.037	0.066	0.03	0.035	0.034	0.019	0.05
Payment of Monies	0.122	0.021	0.02	0.115	0.091	0.006	0.037	0.066	0.03	0.106	0.034	0.096	0.006
Security and Access Control	0.039	0.023	0.048	0.032	0.028	0.046	0.004	0.016	0.007	0.018	0.027	0.036	0.01
Responsible Management & Maintenance Team	0.047	0.029	0.068	0.024	0.021	0.046	0.006	0.024	0.021	0.02	0.027	0.048	0.022
Maintenance Policy	0.026	0.015	0.017	0.018	0.007	0.046	0.004	0.021	0.01	0.018	0.016	0.022	0.035
Cleaning/Housekeeping	0.022	0.016	0.011	0.013	0.008	0.046	0.005	0.017	0.004	0.01	0.01	0.01	0.034
Safety Policies & Procedures	0.046	0.023	0.025	0.01	0.034	0.046	0.019	0.03	0.011	0.018	0.032	0.03	0.025
Fire Prevention & Protection	0.058	0.034	0.076	0.007	0.031	0.046	0.02	0.028	0.005	0.02	0.046	0.06	0.025
After Hours Operations	0.027	0.042	0.022	0.006	0.008	0.046	0.01	0.026	0.013	0.016	0.046	0.015	0.025
Toilet Sanitary & Fittings	0.038	0.065	0.147	0.004	0.01	0.024	0.022	0.024	0.006	0.013	0.032	0.011	0.025
Air Conditioning & Ventilation	0.022	0.034	0.042	0.004	0.034	0.055	0.022	0.034	0.008	0.015	0.028	0.036	0.025
Electrical System & Provision	0.031	0.034	0.076	0.003	0.03	0.055	0.016	0.034	0.009	0.015	0.042	0.026	0.025
Modern IT & Telecommunication	0.059	0.169	0.049	0.003	0.037	0.061	0.018	0.019	0.011	0.015	0.02	0.062	0.025
Building Automation & EMS	0.028	0.025	0.051	0.002	0.023	0.055	0.02	0.037	0.008	0.014	0.032	0.016	0.02
Control of Building Services	0.032	0.01	0.051	0.001	0.023	0.055	0.025	0.017	0.007	0.013	0.032	0.019	0.025
Passenger Lifts Performance & Control	0.031	0.026	0.033	0.001	0.034	0.055	0.042	0.041	0.006	0.013	0.034	0.072	0.025
Car Park Provision & Accessibility	0.035	0.064	0.021	0.001	0.024	0.052	0.037	0.025	0.005	0.008	0.03	0.037	0.024
Building Way finding	0.03	0.015	0.018	0.001	0.025	0.055	0.032	0.017	0.006	0.008	0.025	0.015	0.024
Rental Rate	0.08	0.065	0.023	0.038	0.016	0.003	0.141	0.042	0.108	0.23	0.101	0.096	0.019
Cost of Fit Out	0.019	0.065	0.005	0.01	0.016	0.001	0.141	0.049	0.029	0.046	0.101	0.017	0.002
Total Occupancy Cost	0.023	0.065	0.019	0.006	0.016	0.013	0.141	0.012	0.238	0.23	0.101	0.069	0.002
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CR	0.0938	0.091	0.096	0.091	0.052	0.0938	0.0886	0.0654	0.081	0.1	0.0582	0.0938	0.081

Table 6.19: Overall and Group Mean Sub Criteria Weights

Group Mean Weight (%)					
Main Criteria	Sub Criteria/Factors	Finance (n=10)	ICT & Media (n=9)	Oil & Gas (n=9)	Overall Mean Weight
Location	Branding Image	6.71	6.52	2.63	5.30
	Access to Market	7.84	3.60	3.72	5.20
	Access to Amenities	5.55	3.86	6.38	5.30
	Access to Public Transportation & Terminal	6.26	3.35	8.25	6.00
	Level of Criminal Rate	5.98	7.07	7.27	6.80
Lease	Termination Clause	5.51	4.83	3.36	4.80
	Payment of Monies	3.18	6.44	5.44	4.90
Building	Security and Access Control	2.28	2.42	2.13	2.30
	Responsible Management & Maintenance Team	3.11	3.01	2.61	2.90
	Maintenance Policy	3.24	1.64	1.98	2.30
	Cleaning/Housekeeping	1.81	1.47	1.60	1.60
	Safety Policies & Procedures	2.77	1.92	2.72	2.50
	Fire Prevention & Protection	2.62	3.28	3.12	3.00
	After Hours Operations	1.54	1.74	2.27	1.80
	Toilet Sanitary & Fittings	2.04	3.84	1.85	2.60
	Air Conditioning & Ventilation	2.21	2.27	2.85	2.40
	Electrical System & Provision	2.28	2.77	2.80	2.60
	Modern IT & Telecommunication	2.17	4.83	2.97	3.30
	Building Automation & EMS	1.58	2.44	2.50	2.20
	Control of Building Services	1.72	2.06	2.40	2.21
	Passenger Lifts Performance & Control	1.97	2.16	3.57	2.26
	Car Park Provision & Accessibility	2.06	2.74	2.68	2.25
	Building Way finding	1.49	2.07	2.30	1.90
Financial/Cost	Rental Rate	9.91	8.81	8.40	9.10
	Cost of Fit Out	5.19	5.95	4.46	5.20
	Total Occupancy Cost	9.01	8.68	9.13	8.90

Table 6.20 : Overall and Sub Criteria Mean Weights for Large and Small Organisations

Group Mean Weight (%)				
Main Criteria	Sub Criteria/Factors	Large (n=12)	Small (n=16)	Overall Mean Weight
Location	Branding Image	5.08	5.53	5.30
	Access to Market	2.78	6.93	5.20
	Access to Amenities	5.80	4.88	5.30
	Access to Public Transportation & Terminal	5.91	6.00	6.00
	Level of Criminal Rate	6.29	7.09	6.80
Lease	Termination Clause	4.94	4.75	4.80
	Payment of Monies	4.22	5.39	4.90
Building	Security and Access Control	2.06	2.43	2.30
	Responsible Management & Maintenance Team	2.05	3.56	2.90
	Maintenance Policy	1.75	2.75	2.30
	Cleaning/Housekeeping	1.64	1.63	1.60
	Safety Policies & Procedures	2.00	2.84	2.50
	Fire Prevention & Protection	2.66	3.24	3.00
	After Hours Operations	1.63	2.00	1.80
	Toilet Sanitary & Fittings	1.84	3.10	2.60
	Air Conditioning & Ventilation	2.75	2.20	2.40
	Electrical System & Provision	2.78	2.47	2.60
	Modern IT & Telecommunication	3.34	3.24	3.30
	Building Automation & EMS	2.36	1.99	2.20
	Control of Building Services	2.25	1.90	2.21
	Passenger Lifts Performance & Control	2.65	2.46	2.26
	Car Park Provision & Accessibility	2.91	2.15	2.25
	Building Way finding	2.51	1.50	1.90
Financial/Cost	Rental Rate	9.50	8.74	9.10
	Cost of Fit Out	8.28	2.89	5.20
	Total Occupancy Cost	9.87	8.25	8.90

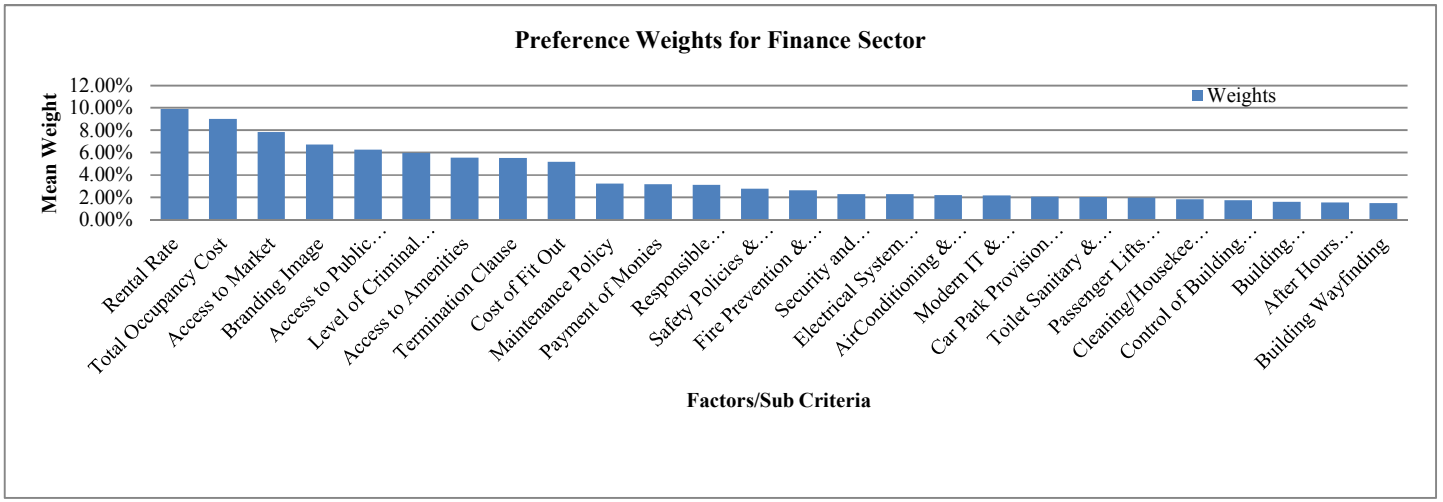


Figure 6.8: Preference for Office Occupation Criteria for Finance Sector

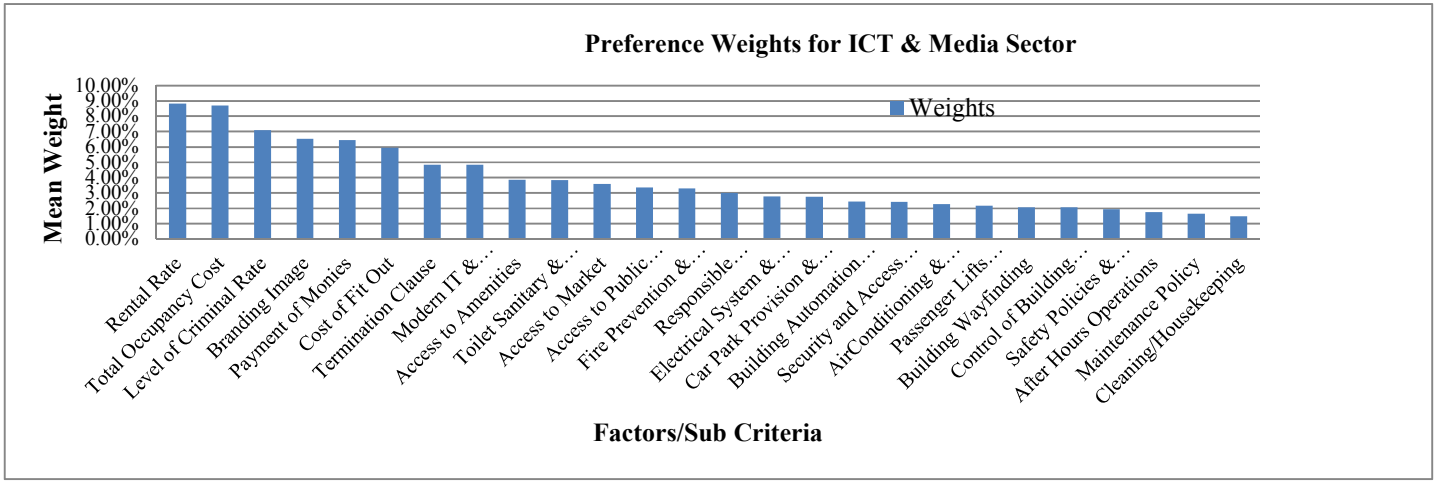


Figure 6.9: Preference for Office Occupation Criteria for ICT & Media Sector

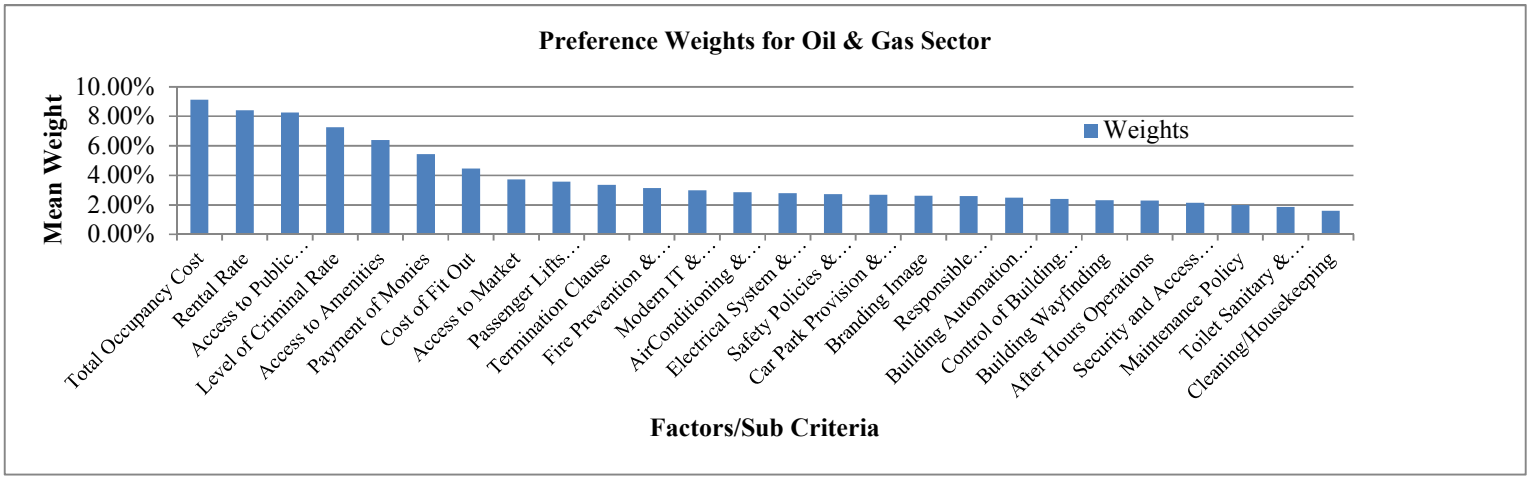


Figure 6.10: Preference for Office Occupation Criteria for Oil & Gas Sector

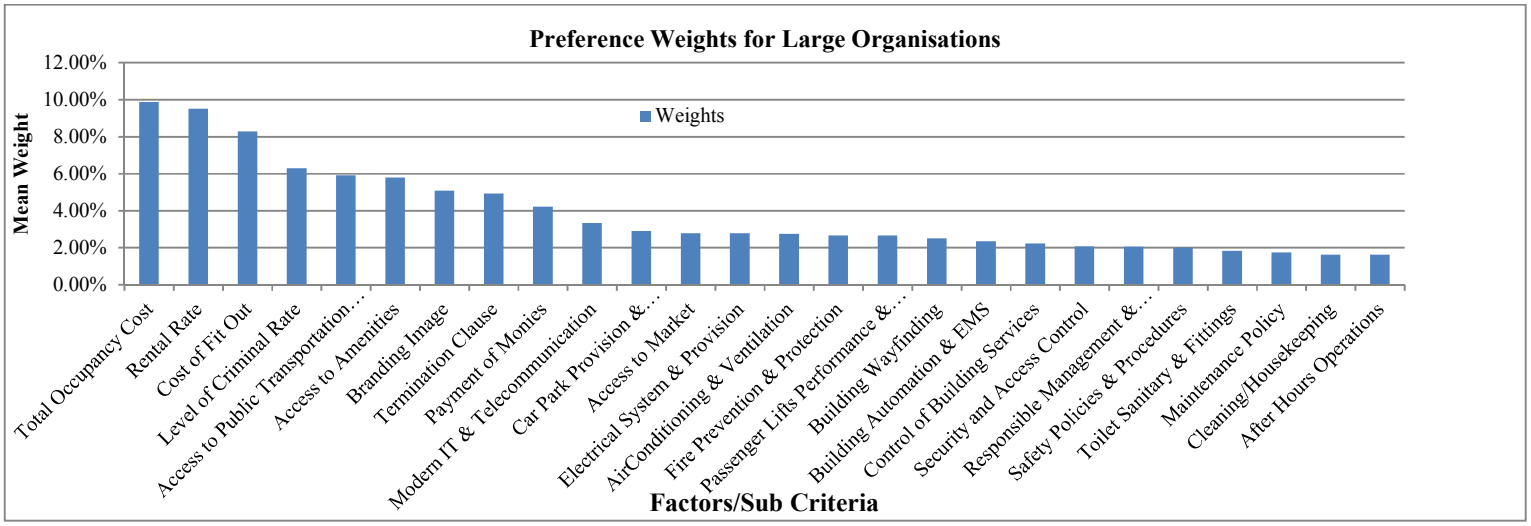


Figure 6.11: Preference for Office Occupation Criteria for Large Organisations

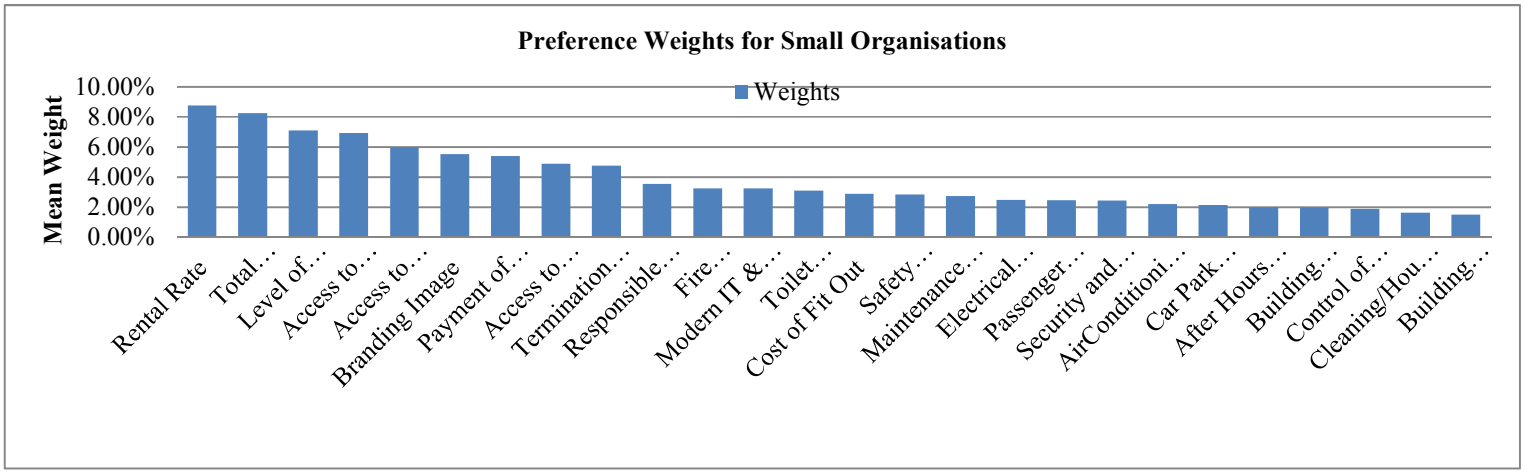


Figure 6.12: Preference for Office Occupation Criteria for Small Organisations

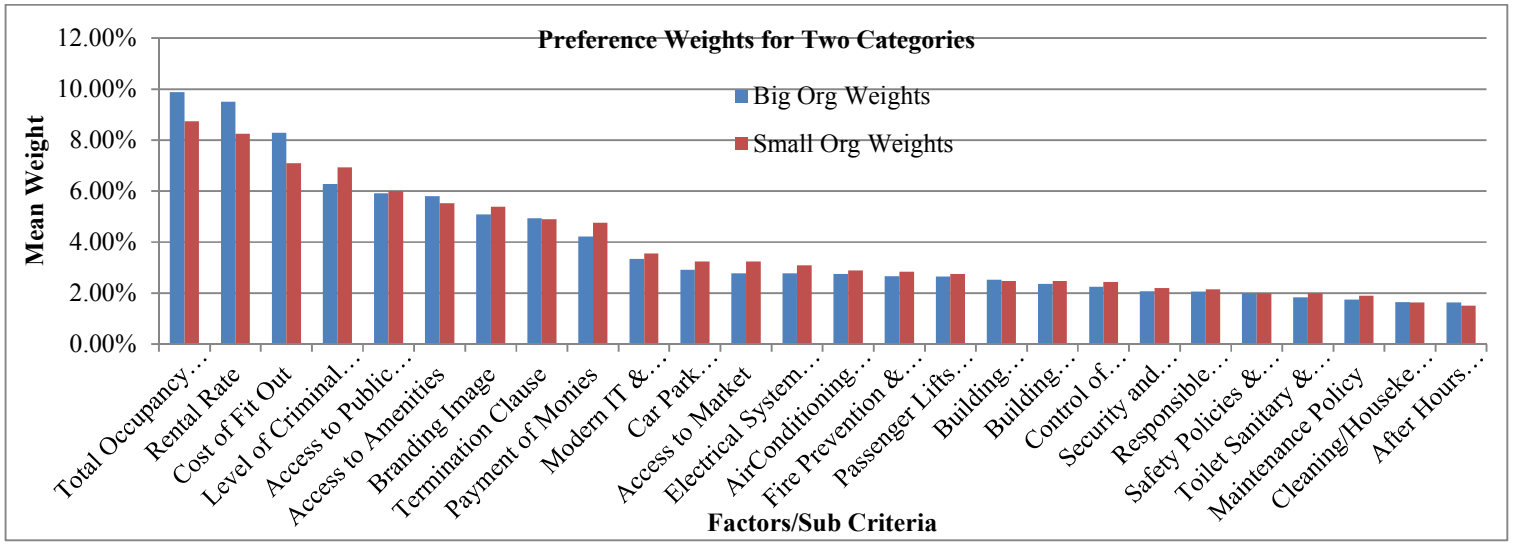


Figure 6.13: Overall Preference Weights between Small and Large Organisations

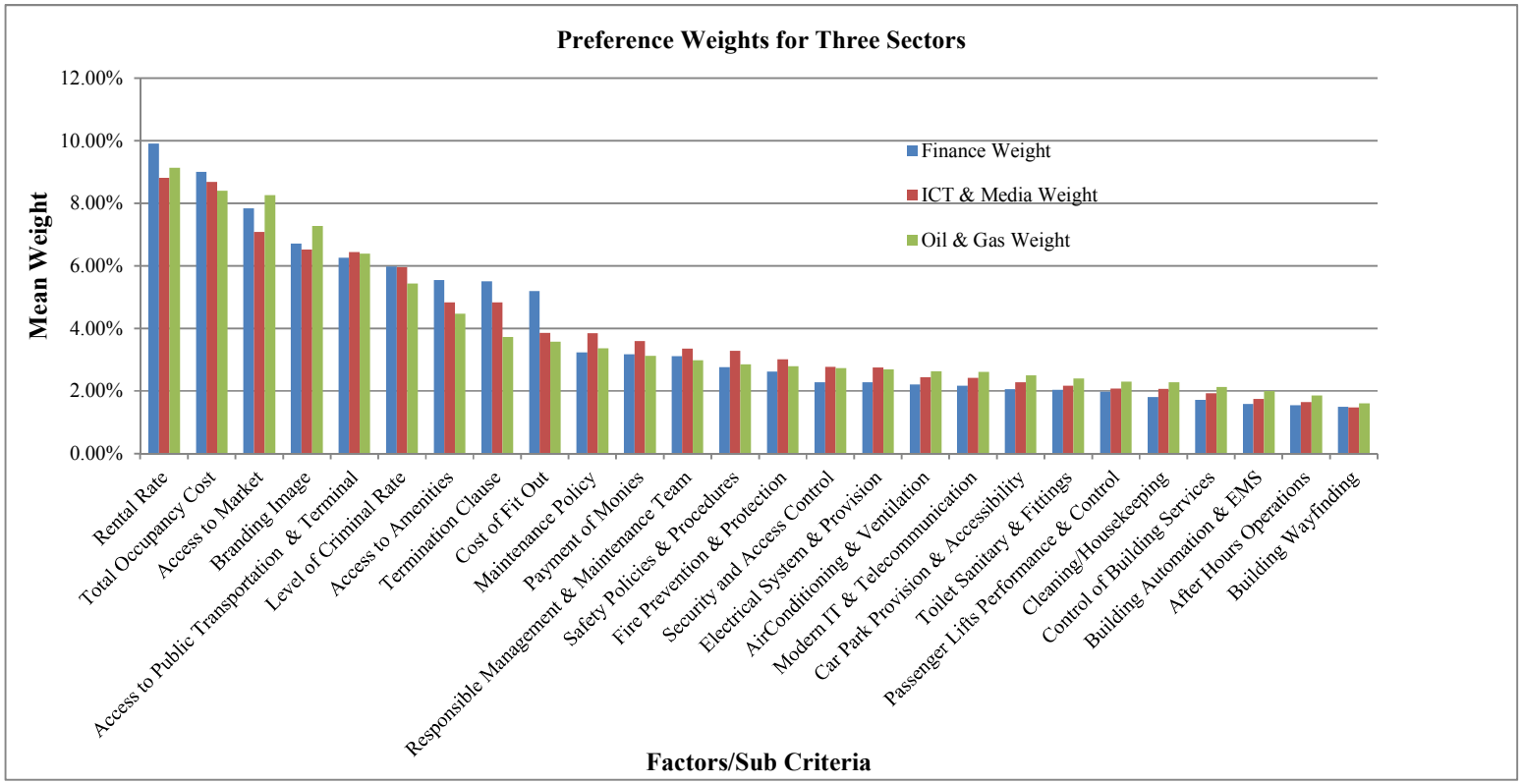


Figure 6.14: Overall Preference Weights between the Three Sectors

6.5.3 Assessment of the Main Criteria and Sub Criteria for Office Space Occupation Decision

Using the AHP analysis for the responses given by the twenty eight (28) tenants, Table 6.22 presents the weightings for the four (4) office occupation decision making main criteria. The average consistency ratio of 0.035 and the range of 0.00-0.10 confirm the reliability of these factor weights. Having determined the local and global weights of all the categories of sector groupings and profiles, comparison of the weights was made in order to make an assessment of the preferences chosen by tenants for the criteria in office space decision making.

6.5.3.1 Assessment of the Main Criteria and Sub Criteria for Office Space Occupation - All Categories of Tenants

When the mean weights of the main and sub criteria of all the categories of tenants are compared, the main criteria in order of importance are 'Location' (34.3 per cent), 'Financial/Cost' (31.2 per cent), 'Lease' (17.1 per cent) and 'Building' (17.4 per cent). The AHP results shows that the 'Financial/Cost' and 'Location' criteria weights account for over 65 per cent of the total factor weights. Table 6.22 presents the weightings for the criteria.

'Location' criteria (34.3 per cent) has the highest weight while 'Lease' criteria (17.1 per cent) has the lowest weight. When comparing the local weights of the sub criteria under 'Location', 'level of criminal rate' (25.2 per cent) has the highest weight while the sub criteria 'access to market' has the lowest weight (15.6 per cent). Under the 'Lease' criteria, 'termination clause' (50.7 per cent) has the higher weight over 'payment of monies' sub

criteria (46.4 per cent). The top three 'Building' sub criteria arranged in descending rank order are 'responsible management & maintenance team' (8.2 per cent), 'modern IT & Telecommunication' (8.0 per cent) and 'fire prevention & protection' (7.2 per cent). The sub criteria that has the lowest weighting is 'cleaning/housekeeping services' (4.7 per cent). Lastly, under the 'Financial/Cost' criteria, 'rental rate' (44.7 per cent) has the highest weight, followed by 'total occupancy cost' (34.6 per cent) and 'cost of fit out' (19.3 percent).

When assessing the global weights of all the criteria, 'rental' and 'occupancy costs' have the highest top two weights (9.1 per cent and 8.9 per cent respectively). 'After hours operations' and 'cleaning/housekeeping' have the two lowest weights among all the criteria (1.8 and 1.6 per cent respectively). The subsequent top priority weights fall on the criteria under 'Location' and 'Lease' while the lowest weights were placed on the criteria under 'Building'.

In terms of ranking, among the 26 sub criteria, the 'Financial' sub criteria were the most important (ranked 1st, 2nd and 8th) compared to 'Location' sub criteria (ranked 3rd, 4th, 5th, 6th and 7th) accounting for the top eight of the top ten sub criteria. Among the other factors, two sub factors were ranked in the top ten; namely 'payment of monies' and 'termination clause' under the 'Lease' criteria. No 'Building' sub criteria were ranked in the top ten sub criteria. A summary of the ranking of the main and sub criteria weights is shown in Table 6.23.

6.5.3.2 Assessment of the Main Criteria and Sub Criteria for Office Space Occupation - Large and Small Organisations Comparison

When assessing the relative importance of criteria among large and small organisations, the mean weights of the main criteria and sub criteria are compared individually. The large organisations have placed the highest weight (34.3 per cent) on 'Financial/Cost' followed by 'Location' (33 per cent), 'Lease' (16.7 per cent) and 'Building' (15.9 per cent). On the other hand, the small organisations have placed the highest weight on 'Location' (35.2 per cent) followed by 'Financial/Cost' (28.9 per cent), 'Building' (18.5 per cent) and 'Lease' (17.4 per cent).

a) Comparison among the Main Criteria – Local Weights

The local weights among the main criteria are compared among the three sectors of tenants so that comparison on the weights among the criteria can be made individually for each category. The overall weights in percentage are shown as Table 6.24.

Large Organisations

For the 'Location' criteria, 'access to public transportation & terminal' has the highest weight (24.1 per cent) while the lowest weight is placed on 'access to market' (11.2 per cent).

For 'Lease' criteria, 'termination clause' is placed with a higher weightage than 'payment of monies' (50.8 per cent and 42.5 per cent respectively).

For 'Building' criteria, 'modern IT & Telecommunication' (9.4 per cent) has the highest weight while 'cleaning/housekeeping' has the lowest weight (4 per cent).

For ‘Financial/Cost’ criteria, ‘rental rate’ has the highest weight (37.6 per cent) while ‘cost of fit out’ has the lowest weight (24 per cent).

Small Organisations

For the ‘Location’ criteria, ‘level of criminal rate’ has the highest weight (29.1 per cent) while ‘branding/image’ has the lowest weight (15.4 per cent).

For ‘Lease’ criteria, ‘termination clause’ is placed with a higher weightage than ‘payment of monies’ (50.7 and 49.3 per cent respectively).

For ‘Building’ criteria, ‘responsible management and maintenance team’ has the highest weight (10 per cent) while ‘building way finding’ has the lowest weight (3.7 per cent).

For ‘Financial/Cost’ criteria, ‘rental rate’ has the highest weight (50.1 per cent) while ‘cost of fit out’ has the lowest weight (15.9 per cent).

b) Comparison among the Criteria between the Large and Small Organisations – Global Weights

When assessing the global weights of all the criteria of the two categories of organisations, there are differences placed by the large and small organisations on the top criteria. The overall weights in percentage are shown as Table 6.25. The large organisations have chosen ‘total occupancy cost’ (9.9 per cent) while the small organisations have chosen ‘rental rate’ (8.7 per cent). These two sub criteria are under the ‘Financial/Cost’ criteria. In terms of ranking, among the 26 sub criteria, the large organisations have placed the ‘Financial’ sub criteria as the most important (ranked 1st, 2nd and 3rd) compared to the ‘Location’ sub criteria (ranked 3rd, 4th, 5th and 7th), accounting for the top seven of the top ten sub criteria. Among the other factors, three sub factors were ranked in the top ten:

namely ‘payment of monies’ and ‘termination clause’ under the Lease criteria, and only one Building sub criteria, which is ‘modern IT & Telecommunication’. The three sub criteria that were ranked the lowest are ‘building wayfinding’, ‘after hours’ operations’ and ‘cleaning/housekeeping’.

On the other hand, the small organisations have only two of the ‘Financial’ criteria in the top ten ranking. All the ‘Location’ and ‘Lease’ criteria are within the top ranked criteria (ranked 3rd to 9th). The ‘Building’ sub criterion that falls under the top ten ranking is ‘responsible management & maintenance team’. The three criteria that were ranked the lowest are ‘control of building services’, ‘cleaning/housekeeping’ and ‘building wayfinding’.

To assess the differences between large and small organisations, Table 6.25 presents the respective criteria weights for these two groups. The weights of each group are ranked accordingly and these ranks of the criteria are also as depicted in Table 6.25. In order to examine the consistency of the ranking of the sub criteria between the two categories of tenants, a rank correlation analysis is carried out. The coefficients obtained are significant at 0.01 level. In considering the high rank correlation coefficient which is significant (rank correlation = 0.7074, p=0.01) of the two groups, it is seen that there is a real correlation between the ranks of the small and large organisations. The correlation matrix is presented in Table 6.26.

In assessing whether there was a significant means weights difference among the small and large organisations, the paired sample t-test was used. As the Levene’s Test for equality of

variance for the data set is not significant (p>0.001), the groups have equality of variance and t-test can be undertaken. The summary of the t-test of all the sub criteria weight means by the two categories (big and small organisations) is shown in Appendix G. Two sub criteria had significant differences in the mean attribute weights. The sub criteria are as follows:

i) 'Cost of fit out' under 'Financial/Cost' criteria (t- score=2.575, df=26, p<0.05). The higher mean value for the large organisations (mean=8.28) reflects that they gave a higher priority to this sub criteria than did the small organisations (mean=2.89). The effect size is 1.033 which indicates that size has a big effect on the 'cost of fit out' in tenant office preference decision making.

i) 'Access to market' under 'Location' criteria (t-score=2.275, df=19, p<0.05). The mean value for the small organisations (mean=0.069) reflects that they gave a higher priority to this sub criteria than did the large organisations (mean=0.027). The effect size is -0.915 which indicates that size has a big effect on the 'access to market' in tenant office preference decision making.

A summary of the mean weight differences of the size of organisations comparisons can be shown in Table 6.21 below.

Table 6.21: Significant Mean Weight Differences

Sub Criteria	t-statistics	*df*	Sig (2-tailed)
Cost of fit out Large vs Small (mean=8.28) (mean=2.89)	2.575	26	P<0.05
Access to Market Large vs Small (mean=0.027) (mean=0.069)	2.275	19	P<0.05

Table 6.22 : Weights of Main And Sub Criteria for All Tenants & Categories

Main Criteria	Local Weights			Sub Criteria	Local Weights			Global Weights		
	ALL	LARGE	SMALL		ALL	LARGE	SMALL	ALL	LARGE	SMALL
Location	0.343	0.330	0.352	Branding Image	0.185	0.227	0.154	0.053	0.051	0.055
				Access to Market	0.156	0.112	0.190	0.052	0.028	0.069
				Access to Amenities	0.186	0.219	0.161	0.053	0.058	0.049
				Access to Public Transportation & Terminal	0.218	0.241	0.200	0.060	0.059	0.060
				Level of Criminal Rate	0.252	0.201	0.291	0.068	0.063	0.071
Lease	0.171	0.167	0.174	Termination Clause	0.507	0.508	0.507	0.048	0.049	0.048
				Payment of Monies	0.464	0.425	0.493	0.049	0.042	0.054
Building	0.174	0.159	0.185	Security and Access Control	0.063	0.056	0.068	0.023	0.021	0.024
				Responsible Management & Maintenance Team	0.082	0.059	0.100	0.029	0.021	0.036
				Maintenance Policy	0.064	0.046	0.078	0.023	0.018	0.028
				Cleaning/Housekeeping	0.047	0.040	0.052	0.016	0.016	0.016
				Safety Policies & Procedures	0.063	0.052	0.071	0.025	0.020	0.028
				Fire Prevention & Protection	0.072	0.070	0.074	0.030	0.027	0.032
				After Hours Operations	0.050	0.044	0.054	0.018	0.016	0.020
				Toilet Sanitary & Fittings	0.063	0.049	0.074	0.026	0.018	0.031
				AirConditioning & Ventilation	0.064	0.075	0.055	0.024	0.028	0.022
				Electrical System & Provision	0.067	0.081	0.057	0.026	0.028	0.025
				Modern IT & Telecomunication	0.080	0.094	0.070	0.033	0.033	0.032
				Building Automation & EMS	0.053	0.060	0.048	0.022	0.024	0.020
				Control of Building Services	0.052	0.058	0.048	0.021	0.023	0.019
				Passenger Lifts Performance & Control	0.066	0.070	0.064	0.026	0.027	0.025
				Car Park Provision & Accessibility	0.065	0.084	0.050	0.025	0.029	0.022
				Building Wayfinding	0.048	0.063	0.037	0.019	0.025	0.015
Financial/Cost	0.312	0.344	0.289	Rental Rate	0.447	0.376	0.501	0.091	0.095	0.087
				Cost of Fit Out	0.193	0.240	0.159	0.052	0.083	0.029
				Total Occupancy Cost	0.346	0.354	0.340	0.089	0.099	0.083
							Total		1.00	

Table 6.23: Ranking of Main and Sub Criteria for the 2 Different Types of Tenants according to Size (Large and Small)

Main Criteria	Local Weights			Sub Criteria	Local Weights			Global Weights		
	ALL	LARGE	SMALL		ALL	LARGE	SMALL	ALL	LARGE	SMALL
Location	1	2	1	Branding Image	4	2	5	5	7	6
				Access to Market	5	5	3	7	12	4
				Access to Amenities	3	3	4	6	6	8
				Access to Public Transportation & Terminal	2	1	2	4	5	5
				Level of Criminal Rate	1	4	1	3	4	3
Lease	4	3	3	Termination Clause	1	1	1	10	8	9
				Payment of Monies	2	2	2	9	9	7
Building	3	4	4	Security and Access Control	9	11	7	20	20	19
				Responsible Management & Maintenance Team	1	9	1	13	21	10
				Maintenance Policy	7	10	2	21	24	16
				Cleaning/Housekeeping	16	16	12	26	25	25
				Safety Policies & Procedures	9	12	5	17	22	15
				Fire Prevention & Protection	3	5	3	12	15	11
				After Hours Operations	14	15	11	25	26	22
				Toilet Sanitary & Fittings	9	13	3	14	23	13
				AirConditioning & Ventilation	7	4	10	19	14	20
				Electrical System & Provision	4	3	9	15	13	17
				Modern IT & Telecomunication	2	1	6	11	10	12
				Building Automation & EMS	12	8	14	22	18	23
				Control of Building Services	13	10	14	23	19	24
				Passenger Lifts Performance & Control	5	5	8	16	16	18
				Car Park Provision & Accessibility	6	2	13	18	11	21
				Building Wayfinding	15	7	16	24	17	26
Financial/Cost	2	1	2	Rental Rate	1	1	1	1	2	1
				Cost of Fit Out	3	3	3	8	3	14
				Total Occupancy Cost	2	2	2	2	1	2

Table 6.24: Respective Local Weights of the Main Criteria for Large and Small Organisations (Local Weight) in Percentage (%)

Criteria	Sub Criteria	All Two (2) Categories	Large	Small
Location		**34.3**	**33.0**	**35.2**
Local Weight	Image/Branding of Location	**18.5**	**22.7**	**15.4**
	Access to Amenities	**18.6**	**21.9**	**16.1**
	Level of Criminal Rate	**25.2**	**20.1**	**29.1**
	Accessibility to Public Transportation & Terminal	**21.8**	**24.1**	**20.0**
	Access to Market	**15.6**	**11.2**	**19.0**
Lease		**17.1**	**16.7**	**17.4**
Local Weight	Payment of Monies	**46.4**	**42.5**	**49.3**
	Termination Clause	**50.7**	**50.8**	**50.7**
Building		**17.4**	**15.9**	**18.5**
Local Weight	Fire Prevention & Protection	**7.2**	**7.0**	**7.4**
	Security & Access Control	**6.3**	**5.6**	**6.8**
	Safety Policies & Procedures	**6.3**	**5.2**	**7.1**
	Air Cond & Ventilation Systems	**6.4**	**7.5**	**5.5**
	Responsible Management & Maintenance Team	**8.2**	**5.9**	**10.0**
	Electric System & Provision	**6.7**	**8.1**	**5.7**
	Toilet & Sanitary Services	**6.3**	**4.9**	**7.4**
	Modern IT & Communication Systems	**8.0**	**9.4**	**7.0**
	Cleaning/Housekeeping	**4.7**	**4.0**	**5.2**
	Maintenance Policy	**6.4**	**4.6**	**7.8**
	Car Park Provision & Accessibility	**6.5**	**8.4**	**5.0**
	Control of Building Services	**5.2**	**5.8**	**4.8**
	After Hours Operations	**5.0**	**4.4**	**5.4**
	Building Automation	**5.3**	**6.0**	**4.8**
	Building Wayfinding	**4.8**	**6.3**	**3.7**
	Passenger Lift Performance & Capacity	**6.6**	**7.0**	**6.4**
Financial/Cost		**31.2**	**34.3**	**28.9**
Local Weight	Rental Rate	**44.7**	**37.6**	**50.1**
	Total Occupancy Cost	**34.6**	**35.4**	**34.0**
	Cost of Fit Out	**19.3**	**24.0**	**15.9**

Table 6.25: Respective Global Weights of the Sub Criteria for Large and Small Organisations (Global Weight) in Percentage (%)

Rank	All Two (2) Categories		Large		Small	
	Sub Criteria	Weight	Sub Criteria	Weight	Sub Criteria	Weight
1	Rental Rate	9.1	Total Occupancy Cost	9.9	Rental Rate	8.7
2	Total Occupancy Cost	8.9	Rental Rate	9.5	Total Occupancy Cost	8.3
3	Level of Criminal Rate	6.8	Cost of Fit Out	8.3	Level of Criminal Rate	7.1
4	Access to Public Transportation & Terminal	6.0	Level of Criminal Rate	6.3	Access to Market	6.9
5	Branding/Image	5.3	Access to Public Transportation & Terminal	5.9	Access to Public Transportation & Terminal	6.0
6	Access to Amenities	5.3	Access to Amenities	5.8	Branding/Image	5.5
7	Access to Market	5.2	Branding/Image	5.1	Payment of Monies	5.4
8	Cost of Fit Out	5.2	Termination Clause	4.9	Access to Amenities	4.9
9	Payment of Monies	4.9	Payment of Monies	4.2	Termination Clause	4.8
10	Termination Clause	4.8	Modern IT & Telecommunication Systems	3.3	Responsible Management & Maintenance Team	3.6
11	Modern IT & Telecommunication	3.3	Car Park Provision & Accessibility	2.9	Fire Prevention & Protection	3.2
12	Fire Prevention & Protection	3.0	Access to Market	2.8	Modern IT & Telecommunication Systems	3.2
13	Responsible Management & Maintenance Team	2.9	Electrical System & Provision	2.8	Toilet Sanitary & Fittings	3.1
14	Toilet Sanitary & Fittings	2.6	AirConditioning & Ventilation	2.8	Cost of Fit Out	2.9
15	Electrical System & Provision	2.6	Fire Prevention & Protection	2.7	Safety Policies & Procedures	2.8
16	Passenger Lifts Performance & Control	2.6	Passenger Lifts Performance & Control	2.7	Maintenance Policy	2.8
17	Safety Policies & Procedures	2.5	Building Wayfinding	2.5	Electrical System & Provision	2.5
18	Car park Provision & Accessibility	2.5	Building Automation & EMS	2.4	Passenger Lifts Performance & Control	2.5

19	AirConditioning & Control	2.4	Control of Building Services	2.3	Security & Access Control	2.4
20	Security & Access Control	2.3	Security & Access Control	2.1	AirConditioning & Ventilation	2.2
21	Maintenance Policy	2.3	Responsible Management & Maintenance Team	2.1	Car Park Provision & Accessibility	2.2
22	Building Automation & EMS	2.2	Safety Policies & Procedures	2.0	After Hours Operations	2.0
23	Control of Building Services	2.1	Toilet Sanitary & Fittings	1.8	Building Automation & EMS	2.0
24	Building Wayfinding	1.9	Maintenance Policy	1.8	Control of Building Services	1.9
25	After Hours Operations	1.8	Cleaning/Housekeeping	1.6	Cleaning/Housekeeping	1.6
26	Cleaning/Housekeeping	1.6	After Hours Operations	1.6	Building Wayfinding	1.5
	Total	100		100		100

Table 6.26: Correlation Matrix of the Ranking for Each Category of Tenants

			All	Large	Small
Spearman's rho	All	Correlation Coefficient	1.000	.859**	.955**
	Large	Correlation Coefficient	.859**	1.000	.707**
	Small	Correlation Coefficient	.955**	.707**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

6.5.3.3 Assessment of the Main Criteria and Sub Criteria for Office Space Occupation - Three Sectors (Finance/Banking, ICT & Media and Oil & Gas) Comparison

a) General Comparison of Main and Sub Criteria Weights

When assessing the relative importance of criteria among the three (3) sectors, the mean weights of the main criteria and sub criteria are compared individually. The Finance organisations have placed the highest weight on 'Financial/Cost' (36.1 per cent) followed by 'Location' (32.8 per cent), 'Lease' (15.9 per cent) and 'Building' (15.2 per cent). ICT & Media organisations have placed the highest weight on 'Location' (32.6 per cent) followed by 'Financial/Cost' (27.9 per cent), 'Building' (21.3 per cent) and 'Lease' (18.2 per cent). Lastly, the Oil & Gas sector organisations have placed the highest weight on 'Location' (37.7 per cent) followed by 'Financial/Cost' (29.1 per cent), 'Lease' (17.4 per cent) and 'Building' (15.8 per cent). A summary of the comparison of the main and sub criteria weights and ranks of the three (3) sectors is shown in Table 6.28 and Table 6.29.

b) Comparison among the Main Criteria – Local Weights

The local weights among the main criteria are compared among the three tenant sectors so that the comparison on the weights among the criteria can be made individually for each sector. A summary of the comparison for the local weights is shown in Table 6.30.

Finance Organisations

For the 'Location' criteria, 'branding/image' has the highest weight (24.2 per cent) while the lowest weight is placed on 'access to amenities' (17.0 per cent).

For 'Lease' criteria, 'termination clause' is placed with a higher weightage than 'payment of monies' (59.7 per cent and 32.3 per cent respectively).

For ‘Building’ criteria, ‘responsible management and maintenance’ team (9.0 per cent) has the highest weight while ‘building wayfinding’ has the lowest weight (4.0 per cent).

For ‘Financial/Cost’ criteria, ‘rental rate’ has the highest weight (47.1 per cent) while ‘cost of fit out’ has the lowest weight (18.0 per cent).

ICT & Media Organisations

For the ‘Location’ criteria, level of ‘criminal rate’ has the highest weight (30.4 per cent) while ‘access to market’ has the lowest weight (14.5 per cent).

For ‘Lease’ criteria, ‘payment of monies’ is placed with a higher weightage than ‘termination clause’ (56.5 and 43.5 per cent respectively).

For ‘Building’ criteria, ‘modern IT & Telecommunication’ (10.2 per cent) has the highest weight while ‘cleaning/housekeeping’ has the lowest weight (4.5 per cent).

For ‘Financial/Cost’ criteria, ‘rental rate’ has the highest weight (45.9 per cent) while ‘cost of fit out’ has the lowest weight (19.1 per cent).

Oil & Gas Organisations

For the ‘Location’ criteria, ‘access to public transportation & terminal’ has the highest weight (29.8 per cent) while ‘branding image’ has the lowest weight (7.7 per cent).

For ‘Lease’ criteria, ‘payment of monies’ is placed with a higher weightage than ‘termination clause’ (53.7 and 46.3 per cent respectively).

For ‘Building’ criteria, ‘passenger lifts’ performance & control’ (8.6 per cent) has the highest weight while ‘cleaning/housekeeping’ has the lowest weight (3.7 per cent).

For ‘Financial/Cost’ criteria, ‘rental rate’ has the highest weight (41.0 per cent) while ‘cost of fit out’ has the lowest weight (21.0 per cent).

Table 6.29 presents the respective main criteria weights for the three (3) sectors' organisations, i.e. Finance/Banking, ICT & Media and Oil & Gas, as well as the ranks.

c) Comparison among sectors – Global Weights

A comparison of the global weights between the three sectors can be made with ANOVA. Since the number of participants is less than 15 to a sector group, it was not appropriate to use the ANOVA to test for significant differences among the three sectors (Chua, 2006). Nevertheless, an attempt to gather the ANOVA results reveals that there is no significant differences among all the sub criteria mean weights across the three sectors. A summary of the ANOVA results is attached in Appendix H.

However, with the respondent numbers meeting the conditions for a t- test (Chua, 2010), the statistically significant weight differences calculations among the three sectors are made in pairs. To identify the difference between the two sectors comparisons, a t- test was conducted to see whether there are significant differences on the global weights of all the sub criteria. Since the Leverne Statistics for all the data set are not significant ($p>0.001$), the groups have equality of variance and t- test analyses can be undertaken.

Thus, there are three (3) combinations of comparison comprising Finance vs ICT & Media, Finance vs Oil & Gas and ICT & Media vs Oil & Gas. An assessment of the rank correlations between the ranks of the global weights is also carried out. This is to examine the consistency of the ranking of the sub criteria among the three sectors of tenants. The correlation matrix for the analysis is shown in Table 6.32.

Finance Sector vs ICT & Media Sector

- Local Weights Comparison

When comparing the local weights among the Finance and ICT & Media organisations, the weights of the main criteria are compared. The Finance sector has placed the highest weightage for the 'Financial/Cost' (36.1 per cent) criteria while the ICT & Media sector has placed the 'Location' criteria (32.6 per cent) highest. The Finance sector has placed 'Building' criteria to have the lowest weight while ICT& Media has placed 'Lease' criteria to have the lowest weight.

- Global Weights Comparison

There are differences placed by the Finance and ICT & Media sector organisations on the top criteria. In terms of ranking among the 26 sub criteria, the Finance sector organisations have placed the top two weights on the sub criteria that are financially related, i.e. 'rental rate' (9.9 per cent) and 'total occupancy cost' (9.0 per cent). The Location sub criteria have been placed in the top ten sub criteria (ranked 3rd, 4th, 5th, 6th, 7th) while 'termination clause', 'cost of fit out' and 'maintenance policy' are ranked 8th,9th and 10th accordingly. The three sub criteria that were ranked the lowest are 'building automation & EMS', 'after hours' operations and 'building wayfinding' accordingly.

On the other hand, the ICT & Media organisations have also placed two of the 'Financial/Cost' sub criteria in the top ten ranking ('rental rate' and 'total occupancy cost'). Similar to the Finance sector organisations, the ICT & Media sector has placed the first two sub criteria under the Financial/Cost criteria as the top ranked sub criteria. This sector however, has placed the other top ten sub criteria among the various main criteria.

The Location sub criteria that are ranked 3rd, 4th and 9th are 'level of criminal rate', 'branding image' and 'access to amenities'. The Lease sub criteria are ranked 5th and 7th accordingly while the other Finance sub criteria (i.e. 'cost of fit out') is ranked 6th. The Building sub criteria that fall under the top ten ranking are 'toilet & sanitary fittings' (ranked 10th) and 'cost of fit out' (ranked 6th). The three criteria that were ranked the lowest are 'after hours operations', 'maintenance policy' and 'cleaning/housekeeping' accordingly.

As the rank correlation for the weightings of the Finance and ICT sectors is 0.72 ($p<0.05$), it is seen that there is a real correlation between the ranks of the Finance and ICT & Media organisations.

Finance vs Oil & Gas Organisations

- Local Weight Comparison

When comparing the local weights among the Finance and Oil & Gas organisations, the weights of the main criteria are compared. The Finance sector has placed the highest weightage for 'Financial/Cost' criteria (36.1 per cent) while the Oil & Gas sector has placed 'Location' criteria (37.7 percent) as the highest. Table 6.28 also presents the respective criteria weights for these two groups.

Both the sectors have placed the 'Lease' criteria and 'Building' criteria to have the 3rd and 4th ranks respectively. The weights of each group are ranked accordingly and these ranks of the criteria are as depicted in Table 6.29.

- Global Weights Comparison

While the two sectors' correlation is relatively high, there was a significant difference in their sub criteria priority weight for the 'passenger lift capacity' & 'performance' under 'Building' criteria (t score=2.141, df=26, $p<0.05$). The higher mean value for the Oil & Gas sector organisations (mean=3.57) reflects a higher priority given by them to this sub criteria rather than the Finance sector organisations (mean=1.97).

When assessing the global weights of all the criteria of the two sectors of organisations, there are differences placed by the Finance and Oil & Gas sectors on the top criteria. The Finance sector organisation has chosen 'rental rate' (9.9 per cent) while the Oil & Gas organisations has chosen 'total occupancy cost' (9.1 per cent). These two sub criteria are under the 'Financial/Cost' criteria. In terms of ranking, among the 26 sub criteria, the Finance sector has placed the 'Financial/Cost' sub criteria as the two most important (ranked 1st and 2nd) compared to 'Location' sub criteria (ranked 3rd, 4th, 5th , 6th and 7th), accounting for the top seven of the top ten sub criteria. Among the other criteria, three other sub criteria were ranked top ten; namely 'termination clause', 'cost of fit out' and' maintenance policy'. The three sub criteria that were ranked the lowest are 'building automation & EMS', 'after hours' operations' and 'building wayfinding'.

Similarly the Oil & Gas sector organisations have only two of the 'Financial/Cost' sub criteria in the top ten ranking. However, there are variations in the ranks of the top ten sub criteria. The Oil & Gas sector has placed 'access to transportation', 'level of criminal rate', 'access to amenities' and 'access to market' as the top ten sub criteria under 'Location' (ranked 3rd, 4th, 5th and 8th). 'Termination clause' and 'payment of monies' sub criteria are

ranked 10th and 6th respectively. The 'Building' sub criteria that falls under the top ten ranking is 'passenger lift performance & control'. The three criteria that were ranked the lowest are 'maintenance policy', 'toilet sanitary & fittings' and 'cleaning/housekeeping'.

In considering the two sectors' significant high rank correlation coefficient (rank correlation = 0.7032, p=0.05), it is seen that there is a real correlation between the ranks of the Finance and Oil & Gas organisations.

ICT & Media vs Oil & Gas organisations

- Local Weight Comparison

Finally, the priority weights of the main and sub criteria of the ICT & Media sector are compared to those in the Oil & Gas sector. In comparing the mean weights among the ICT & Media and Oil & Gas organisations, the weights of the main criteria are compared initially. Both the Finance and ICT & Media sectors have placed the highest weightage for the 'Financial/Cost' criteria (32.6 and 37.7 per cent respectively). The ICT & Media has placed 'Lease' criteria as the lowest ranked criteria (18.2 per cent) while the Oil & Gas sector has placed the 'Building' criteria as the lowest ranked criteria (15.8 per cent). Table 6.29 presents the respective criteria weights for these two groups. The weights of each group are ranked accordingly and these ranks of the criteria are also depicted in Table 6.29.

- Global Weights Comparison

In considering the significant high rank correlation coefficient (rank correlation = 0.723, p=0.05) of the two sectors, it is seen that there is a real correlation between the ranks of the ICT & Media and Oil & Gas organisations. While the two sectors' correlation is relatively

high, there was a significant difference in their criteria priority for 'access to public transportation & terminal' under 'Location' (t score=2.418, df=16, $p<0.05$). The higher mean value for the Oil & Gas sector organisations (mean=8.25) reflects that they gave a higher priority to this sub criteria than did the ICT & Media sector organisations (mean=3.35) for this sub criteria.

When assessing the global weights of all the criteria of the two sectors of organisations, there are differences placed by the ICT & Media and Oil & Gas sectors on the top criteria. The ICT & Media sector organisation have ranked 'rental rate' (8.8 per cent) as the number one while the Oil & Gas organisations have chosen 'total occupancy cost' (9.1 per cent). These two sub criteria are under the 'Financial/Cost' criteria.

In terms of ranking, among the 26 sub criteria, the ICT & Media sector have placed the 'Financial/Cost' sub criteria ('rental rate' and 'total occupancy cost') as the two most important (ranked 1st and 2nd), compared to 'Location' sub criteria (ranked 3rd, 4th, and 9th), accounting for the top seven of the top ten sub criteria. Among the other criteria, five other sub criteria were ranked top ten; namely' termination clause', 'payment of monies', 'cost of fit out', 'modern IT & EMS' and 'toilet & sanitary'. The three sub criteria that were ranked the lowest are 'after hours' operations', 'maintenance policy' and 'cleaning/housekeeping'.

Similarly, the Oil & Gas sector organisations have two of the 'Financial/Cost' criteria in the top ten ranking. However, there are variations in the ranks of the top ten sub criteria. The Oil & Gas sector has placed 'access to transportation', 'level of criminal rate', 'access

to amenities' and 'access to market' as the top ten sub criteria under 'Location' (ranked 3rd, 4th, 5th and 8th). 'Termination clause' and 'payment of monies' sub criteria are ranked 10th and 6th respectively. The 'Building' sub criteria that falls under the top ten ranking is 'passenger lift performance & control'. The three criteria that were ranked the lowest are 'maintenance policy', 'toilet sanitary & fittings' and 'cleaning/housekeeping'.

The summary of the statistically mean weight differences of the sector comparisons can be shown in Table 6.27 below.

Table 6.27: Significant Mean Weight Differences

Sub Criteria	t-statistics	*df*	Sig (2-tailed)
Passenger Lift Capacity & Performance Finance vs Oil & Gas (mean=1.97) (mean=3.57)	2.141	26	P<0.05
Public Transportation & Terminal ICT & Media vs Oil & Gas (mean=3.35) (mean=8.25)	2.418	16	P<0.05

To illustrate the comparison of the global weights (weights of the sub criteria) and the corresponding ranks for each sector, the summary is shown in Table 6.31.

Table 6.28: Local and Global Weights for Main and Sub Criteria for All Tenants Sectors

Main Criteria	Local Weights				Sub Criteria	Local Weights				Global Weights			
	ALL	FIN	ICT	OG		ALL	FIN	ICT	OG	ALL	FIN	ICT	OG
Location	0.343	0.328	0.326	0.377	Branding Image	0.185	0.242	0.230	0.077	0.053	0.067	0.065	0.026
					Access to Market	0.156	0.207	0.145	0.112	0.052	0.078	0.036	0.037
					Access to Amenities	0.186	0.170	0.166	0.224	0.053	0.056	0.039	0.064
					Access to Public Transportation & Terminal	0.218	0.207	0.150	0.298	0.060	0.063	0.034	0.083
					Level of Criminal Rate	0.252	0.174	0.304	0.288	0.068	0.060	0.071	0.073
Lease	0.171	0.159	0.182	0.174	Termination Clause	0.507	0.597	0.435	0.463	0.048	0.055	0.048	0.034
					Payment of Monies	0.464	0.323	0.565	0.537	0.049	0.032	0.064	0.054
Building	0.174	0.152	0.213	0.158	Security and Access Control	0.063	0.062	0.075	0.052	0.023	0.023	0.024	0.021
					Responsible Management & Maintenance Team	0.082	0.090	0.086	0.071	0.029	0.031	0.030	0.026
					Maintenance Policy	0.064	0.085	0.053	0.051	0.023	0.032	0.016	0.020
					Cleaning/Housekeeping	0.047	0.058	0.045	0.037	0.016	0.018	0.015	0.016
					Safety Policies & Procedures	0.063	0.066	0.052	0.070	0.025	0.028	0.019	0.027
					Fire Prevention & Protection	0.072	0.068	0.074	0.075	0.030	0.026	0.033	0.031
					After Hours Operations	0.050	0.042	0.049	0.059	0.018	0.015	0.017	0.023
					Toilet Sanitary & Fittings	0.063	0.066	0.074	0.049	0.026	0.020	0.038	0.019
					AirConditioning & Ventilation	0.064	0.067	0.054	0.070	0.024	0.022	0.023	0.029
					Electrical System & Provision	0.067	0.072	0.062	0.068	0.026	0.023	0.028	0.028
					Modern IT & Telecommunication	0.080	0.068	0.102	0.072	0.033	0.022	0.048	0.030
					Building Automation & EMS	0.053	0.042	0.057	0.061	0.022	0.016	0.024	0.025
					Control of Building Services	0.052	0.050	0.049	0.059	0.021	0.017	0.021	0.024
					Passenger Lifts Performance & Control	0.066	0.063	0.051	0.086	0.026	0.020	0.022	0.036
					Car Park Provision & Accessibility	0.065	0.062	0.068	0.064	0.025	0.021	0.027	0.027
					Building Wayfinding	0.048	0.040	0.050	0.056	0.019	0.015	0.021	0.023
Financial /Cost	0.312	0.361	0.279	0.291	Rental Rate	0.447	0.471	0.459	0.410	0.091	0.099	0.088	0.084
					Cost of Fit Out	0.193	0.180	0.191	0.210	0.052	0.052	0.060	0.045
					Total Occupancy Cost	0.346	0.349	0.310	0.380	0.089	0.090	0.087	0.091
									Total	1.00			

Table 6.29: Ranking of Main and Sub Criteria for All Tenant Sectors

Main Criteria	Local Weights Rank				Sub Criteria	Local Weights Rank				Global Weights Rank			
	ALL	FIN	ICT	OG		ALL	FIN	ICT	OG	ALL	FIN	ICT	OG
Location	1	2	1	1	Branding Image	4	1	2	5	5	4	4	17
					Access to Market	5	2	5	4	7	3	11	8
					Access to Amenities	3	5	3	3	6	7	9	5
					Access to Public Transportation & Terminal	2	2	4	1	4	5	12	3
					Level of Criminal Rate	1	4	1	2	3	6	3	4
Lease	4	3	4	3	Termination Clause	1	1	2	2	10	8	7	10
					Payment of Monies	2	2	1	1	9	11	5	6
Building	3	4	3	4	Security and Access Control	9	10	3	13	20	15	18	23
					Responsible Management & Maintenance Team	1	1	2	4	13	12	14	18
					Maintenance Policy	7	2	10	14	21	10	25	24
					Cleaning/Housekeeping	16	12	16	16	26	22	26	26
					Safety Policies & Procedures	9	7	1	5	17	13	23	15
					Fire Prevention & Protection	3	4	4	2	12	14	13	11
					After Hours Operations	14	14	14	10	25	25	24	22
					Toilet Sanitary & Fittings	9	7	4	15	14	20	10	25
					AirConditioning & Ventilation	7	6	9	5	19	17	19	13
					Electrical System & Provision	4	3	7	7	15	16	15	14
					Modern IT & Telecommunication	2	4	1	3	11	18	8	12
					Building Automation & EMS	12	15	8	9	22	24	17	19
					Control of Building Services	13	13	14	10	23	23	22	20
					Passenger Lifts Performance & Control	5	9	12	1	16	21	20	9
					Car Park Provision & Accessibility	6	10	6	8	18	19	16	16
					Building Wayfinding	15	16	13	12	24	26	21	21
Financial /Cost	2	1	2	2	Rental Rate	1	1	1	1	1	1	1	2
					Cost of Fit Out	3	3	3	3	8	9	6	7
					Total Occupancy Cost	2	2	2	2	2	2	2	1
									Total	1.00			

Table 6.30: Respective Weights and Ranks for Each Tenant Sector for Main Criteria (Local Weight) in Percentage (%)

Criteria	All Tenants (Important Index)	All Three (3) Sectors	Finance	ICT & Media	Oil & Gas
Location		**34.3**	**32.8**	**32.6**	**37.7**
Local Weight	• Image/Branding of Location	18.5	24.2 (highest)	23.0	7.7 (lowest)
	• Access to Amenities	18.6	17.0 (lowest)	16.6	22.4
	• Level of Criminal Rate	25.2 (highest)	17.4	30.4 (highest)	28.8
	• Accessibility to Public Transportation & Terminal	21.8	20.7	15.0	29.8 (highest)
	• Access to Market	15.6 (lowest)	20.7	14.5 (lowest)	11.2
		100	100	100	100
Lease	•	**17.1**	**15.9**	**18.2**	**17.4**
Local Weight	• Payment of Monies	46.4	59.7 (highest)	43.5	46.3
	• Termination Clause	50.7 (highest)	32.3	56.5 (highest)	53.7 (highest)
		100	100	100	100
Building		**17.4**	**15.2**	**21.3**	**15.8**
Local Weight	• Fire Prevention & Protection	7.2	6.8	7.4	7.5
	• Security & Access Control	6.3	6.2	7.5	5.2
	• Safety Policies & Procedures	6.3	6.6	5.2	7.0
	• Air Cond & Ventilation Systems	6.4	6.7	5.4	7.0
	• Responsible Management & Maintenance Team	8.2 (highest)	9.0 (highest)	8.6	7.1
	• Electric System & Provision	6.7	7.2	6.2	6.8
	• Toilet & Sanitary Services	6.3	6.6	7.4	4.9
	• Modern IT & Communication Systems	8.0	6.8	10.2 (highest)	7.2
	• Cleaning/Housekeeping	4.7	5.8	4.5 (lowest)	3.7 (lowest)
	• Maintenance Policy	6.4	8.5	5.3	5.1
	• Car Park Provision & Accessibility	6.5	6.2	6.8	6.4
	• Control of Building Services	5.2	5.0	4.9	5.9
	• After Hours Operations	5.0	4.2	4.9	5.9
	• Building Automation	5.3	4.2	5.7	6.1
	• Building Wayfinding	4.8 (lowest)	4.0 (lowest)	5.0	5.6
	• Passenger Lift Performance & Capacity	6.6	6.3	5.1	8.6 (highest)
		100	100	100	100
Financial/Cost		**31.2**	**36.1**	**27.9**	**29.1**
Local Weight	• Rental Rate	44.7 (highest)	47.1 (highest)	45.9 (highest)	41.0 (highest)
	• Total Occupancy Cost	34.6	34.9	31.0	38.0
	• Cost of Fit Out	19.3 (lowest)	18.0 (lowest)	19.1 (lowest)	21.0 (lowest)
		100	100	100	100

Table 6.31: Respective Weights and Ranks for Each Tenant Sector of the Sub Criteria (Global Weight) in Percentage (%)

Rank	All Three (3) Sectors		Finance		ICT & Media		Oil & Gas	
	Sub Criteria	Weight	Sub Criteria	Weight	Sub Criteria	Weight	Sub Criteria	Weight
1	Rental Rate	9.1	Rental Rate	9.9	Rental Rate	8.8	Total Occupancy Cost	9.1
2	Total Occupancy Cost	8.9	Total Occupancy Cost	9.0	Total Occupancy Cost	8.7	Rental Rate	8.4
3	Level of Criminal Rate	6.8	Access to Market	7.8	Level of Criminal Rate	7.1	Access to Public Transportation & Terminal	8.3
4	Access to Public Transportation & Terminal	6.0	Branding/Image	6.7	Branding/Image	6.5	Level of Criminal Rate	7.3
5	Branding/Image	5.3	Access to Public Transportation & Terminal	6.3	Payment of Monies	6.4	Access to Amenities	6.4
6	Access to Amenities	5.3	Level of Criminal Rate	6.0	Cost of Fit Out	6.0	Payment of Monies	5.4
7	Access to Market	5.2	Access to Amenities	5.6	Termination Clause	4.8	Cost of Fit Out	4.5
8	Cost of Fit Out	5.2	Termination Clause	5.5	Modern IT & Telecommunication Systems	4.8	Access to Market	3.7
9	Payment of Monies	4.9	Cost of Fit Out	5.2	Access to Amenities	3.9	Passenger Lifts Performance & Control	3.6
10	Termination Clause	4.8	Maintenance Policy	3.2	Toilet Sanitary & Fittings	3.8	Termination Clause	3.4
11	Modern IT & Telecommunication System	3.3	Payment of Monies	3.2	Access to Market	3.6	Fire Prevention & Protection	3.1
12	Fire Prevention & Protection	3.0	Responsible Management & Maintenance Team	3.1	Access to Public Transportation & Terminal	3.4	Modern IT & Telecommunication Systems	3.0
13	Responsible Management & Maintenance Team	2.9	Safety Policies & Procedures	2.8	Fire Prevention & Protection	3.3	AirConditioning & Ventilation	2.9
14	Toilet Sanitary & Fittings	2.6	Fire Prevention & Protection	2.6	Responsible Management & Maintenance Team	3.0	Electrical System & Provision	2.8
15	Electrical System & Provision	2.6	Security and Access Control	2.3	Electrical System & Provision	2.8	Safety Policies & Procedures	2.7

16	Passenger Lifts Performance & Control	2.6	Electrical System & Provision	2.3	Car Park Provision & Accessibility	2.7	Car park Provision & Accessibility	2.7
17	Safety Policies & Procedures	2.5	Airconditioning & Ventilation	2.2	Building Automation & EMS	2.4	Branding/Image	2.6
18	Car Park Provision & Accessibility	2.5	Modern IT & Telecommunication	2.2	Security & Access Control	2.4	Responsible Management & Maintenance team	2.6
19	AirConditioning & Ventilation	2.4	Car Park Provision & Accessibility	2.1	AirConditioning & Ventilation	2.3	Building Automation & EMS	2.5
20	Security & Access Control	2.3	Toilet Sanitary & Fittings	2.0	Passenger Lifts Performance & Control	2.2	Control of Building Services	2.4
21	Maintenance Policy	2.3	Passenger Lifts Performance & Control	2.0	Building Wayfinding	2.1	Building Wayfinding	2.3
22	Building Automation & EMS	2.2	Cleaning/Housekeeping	1.6	Control of Building Services	2.1	After Hours Operations	2.3
23	Control of Building Services	2.1	Control of Building Services	1.7	Safety Policies & Procedures	1.9	Security & Access Control	2.1
24	Building Wayfinding	1.9	Building Automation & EMS	1.6	After Hours Operations	1.7	Maintenance Policy	2.0
25	After Hours Operations	1.8	After Hours Operations	1.5	Maintenance Policy	1.6	Toilet Sanitary & Fittings	1.9
26	Cleaning/ Housekeeping	1.6	Building Wayfinding	1.5	Cleaning/ Housekeeping	1.5	Cleaning/ Housekeeping	1.6
	Total	100	Total	100	Total	100	Total	100

Table 6.32: Correlation Matrix of the Ranking for Each Sector of Tenants

			All	Finance	ICT & Media	Oil & Gas
Spearman's rho	All	Correlation Coefficient	1.000	.703**	.723**	.720**
	Finance	Correlation Coefficient	.703**	1.000	.720**	.703**
	ICT & Media	Correlation Coefficient	.723**	.720**	1.000	.723**
	Oil & Gas	Correlation Coefficient	.720**	.703**	.723**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).

6.6 APPLICATION OF AHP APPROACH TO THE TOS FRAMEWORK

An attempt is then made to draw the weights gathered from the AHP synthesis to the main objective or goal of the AHP mode, i.e. to develop a Tenant Office Space (TOS) preference indicator for office buildings in Kuala Lumpur. By applying the multi-criteria decision making (MCDM) approach and linking the rational decision making perspective of tenants from the customers' perspective (as captured in the conceptual framework (see Section 3.9), the TOS framework is developed.

By using the AHP, the relative preference for the office space selection process by tenants can be captured through a structured manner. Building the AHP structure to the stage of obtaining the weighting of each criteria, the involvement of tenants is the key component behind the framework development. For the purpose of this study, the terms 'main criteria' and 'sub criteria' are used in AHP to replace the terms 'areas' and 'factors' which were used in the earlier methods. After the validation of the structure and the criteria weighting in the AHP model by relevant tenants in the office space selection, the office suitability framework can act as a guide for the determination of the best tenant sector that fits an office space.

The framework attempts to make an assessment of the best tenant sector (with their specific office space preference) that matches the specific office building criteria. For the purpose of generating the assessment tool, the framework is constructed based on the following ingredients:

- The important criteria and sub criteria for assessing tenants' office space preference
- The priority weights of these criteria and sub criteria

- The rating of the office space to be tenanted through the identified measures of the criteria (office measures availability indicator)

6.6.1 Important Criteria

In Section 6.5, the important main and sub criteria were identified to be considered when constructing the framework. These important criteria and sub criteria also form the basis to determine the measurement for assessing the office building. As these criteria and sub criteria have been validated by the experts and chosen by tenants of office buildings in Kuala Lumpur city centre, they are the essential factors to be rated.

6.6.2 The Priority Weights of the Important Criteria

As the four (4) main criteria and twenty six (26) sub criteria do not have the same degree of importance for each type of tenants, the determination of the relative weights is essential. Using AHP, the determination of the tenants' preference for office space is structured into a hierarchy tree comprising 'the goal' (first level), 'main criteria' (second level) and 'sub criteria' (third level) as shown in Figure 5.2 of Chapter 5. The resulting priority weights are discussed in detail in Section 6.5.3 above. The AHP application to the Office Occupation decision making by tenants can be shown as Figure 6.15 below.

6.6.3 Rating of Office Space

The next step in the development of the TOS framework is to rate the office space provision of a particular purpose built office building. Firstly, the main and sub criteria that have been identified as important by tenants would be used to determine the measures for the assessment of these criteria. The identification of the measures for each of the sub

criteria is explained in Section 5.3.5 (a) earlier. In making the assessment of what the office building has, the information gathered from the office buildings classification exercise conducted earlier was also taken into account (Adnan *et al*, 2009, Daud *et al*, 2011, Ibrahim *et al*., 2010). For the purpose of developing a basic assessment framework, the building score is determined by the availability of the measures through a score of either 0 or 1 (to represent whether the measure is available or not available) in this study. By combining the availability of the identified measures (for the attributes of the office space at a given office building) known as building measure availability indicator and the relative weights of the sub criteria, the framework is developed. Figure 6.16 presents the TOS framework which can assess the most suitable tenants among the three (3) sectors illustrated in this study for a given office space. The indicated weight is the mean weights of the three sectors of tenants for each sub criteria.

FIGURE 6.15 : Application of AHP to Office Space Preference Framework

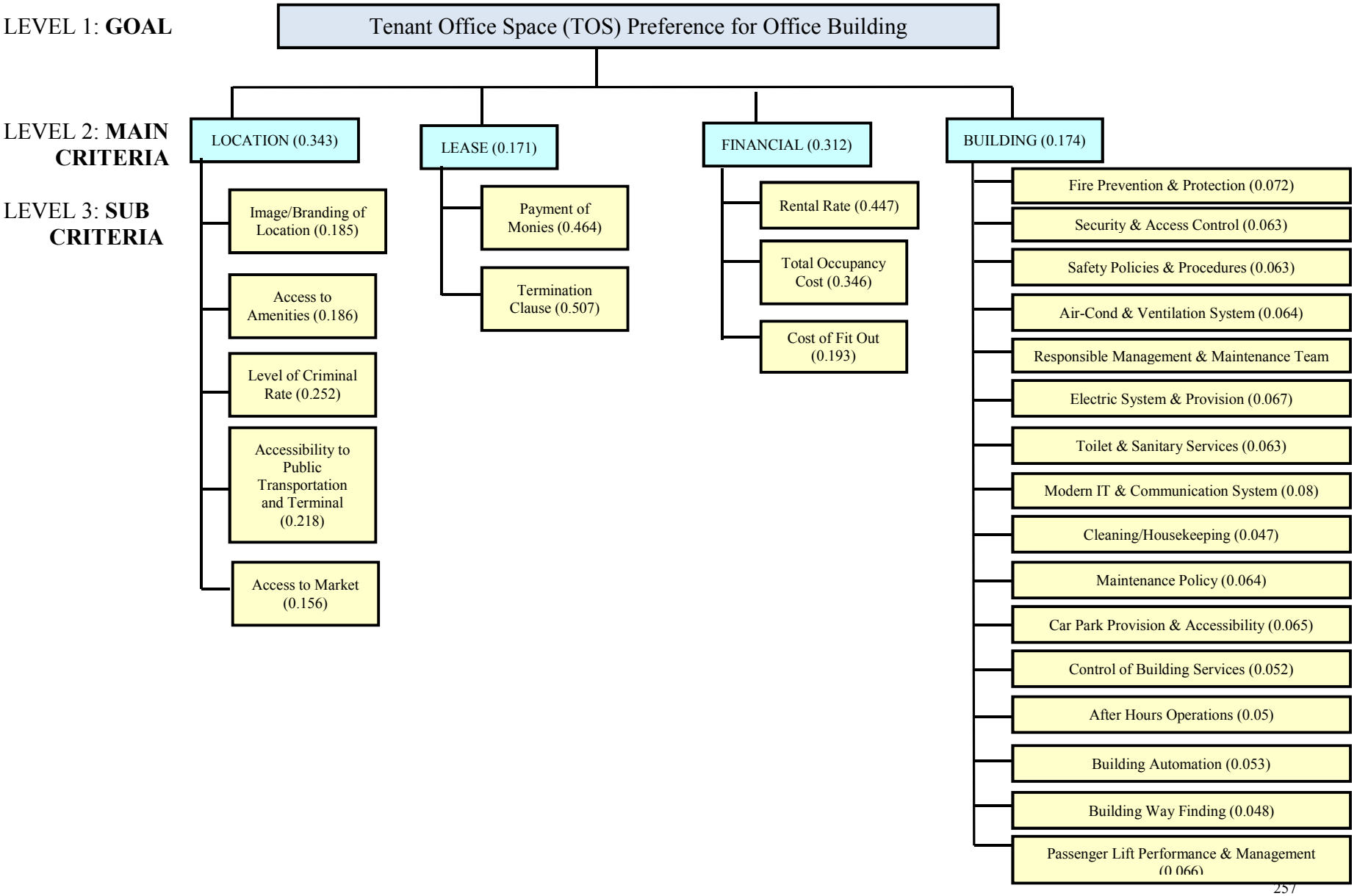


Figure 6.16: The TOS Framework for Assessing Suitable Tenants

6.7 LIMITATIONS OF TOS FRAMEWORK

It is pertinent at this juncture to highlight the limitations of the framework. Firstly, there is a difficulty to make an assessment of some of the criteria selected to rate the office buildings. Certain information such as the lease terms and financial/cost components are confidential and not accessible to an independent evaluator unless the information is given by the owner or manager of the building. In many instances, this is not possible unless the assessment is made only by these stakeholders of the office space. Secondly, as mentioned earlier, the assessment of the building is limited to the available information from a past research (Daud *et al*., 2011) and currently adopts a score of only 1 or 0 depending on the building measures availability. The measurement can be further refined to reflect a bigger range of scores that can accurately describe the office space.

By constructing the framework and adding the office measures and the office building assessment to be compared against the global weights of the identified main and sub criteria, the evaluator is able to assess the score of each of the sector groups and make an assessment of the likely tenant that fits the building features.

6.8 TOS FRAMEWORK VALIDATION

This section presents the Seventh Stage of the fieldwork, which involved the validation exercise conducted to check whether the framework could display the preference score of the best tenant sector that fits the office space of an office building with certain measured attributes. Two methods were used. The first is to compare the tenants' criteria preference rank developed from the AHP method with the ones selected by invited tenants in the

validation exercise. The second method is to check the indication given by the invited tenants on their interest to rent office space against the ranks identified by the TOS framework for nine (9) selected office buildings, should the space be available to them.

Sixteen (16) office tenants from the three (3) sectors, i.e. Finance/Banking, ICT & Media and Oil and Gas, who did not participate in the AHP process were invited. There were five (5) tenants from the Banking/Finance sector, five (5) tenants from the ICT & Media sector and six (6) tenants from the Oil & Gas sector. They were asked to rank the main criteria of the preference framework and indicate their interest (whether the space would be suitable or not suitable) to rent the office space at nine (9) selected office buildings, should the space is available to them. The validation exercise was carried out between the months of December 2010 and March 2011. The building score for the chosen office buildings in the validation exercise is derived from the information that was gathered from an earlier study to classify office buildings in Malaysia (Mohd *et al.*, 2010).

6.8.1 Correlation between the Tenants' and TOS Ranks

The summary of the rank correlation of the ranks generated by the study against the ranks by the invited tenants in the validation exercise is shown in Table 6.33 below:

Table 6.33: Rank Correlation Comparison (Tenants and TOS)

Criteria/Sub Criteria	AHP rank	Validation - Mean Rank	Rank Correlation Coefficient	Differences/Comments
Sector: Finance/Banking				
Location	**2**	**1**		There is an inverse relatively low correlation between the two ranks. The correlation coefficient is not significant (n=5,
- Branding Image	1	3.6	**-0.41**	
- Access to Market	2.5	4.1		
- Access to Amenities	5	2.2		

- Access to Public Transportation & Terminal	2.5	1.6		critical value=0.9)
- Level of Criminal Rate	4	3.4		
Lease	**3**	**3**		There is no correlation between the two ranks.
- Termination Clause	1	1.5	0	There are only two sub
- Payment of Monies	2	1.5		criteria to choose from
Building	**4**	**3.6**		There is a relatively high correlation between the
- Security& Access Control	10	9.6	**0.69**	two ranks. The correlation
- Responsible Management & Maintenance Team	1	1.6		coefficient is significant (n=16, critical
- Maintenance Policy	2	7.5		value=0.425)
- Cleaning/Housekeeping	12	10.6		
- Safety Policies & Procedures	7	3		
- Fire Prevention & Protection	4.5	5.9		
- After Hours Operation	14	11.1		
- Toilet Sanitary & Fittings	7	10.9		
- Air-conditioning & Ventilation	6	5.9		
- Electrical System & Provision	3	5.6		
- Modern IT & Telecommunication	4.5	10		
- Building Automation & EMS	15	13		
- Control of Building Services	13	9.7		
- Passenger Lifts Performance & Control	9	5.1		
- Car Park Provision & Accessibiliity	10	6.3		
- Building Wayfinding	16	12.8		
Financial/Cost	**2**	**2**		There is a relatively low correlation between the
- Rental Rate	1	1.7	**0.4**	two ranks. As n<5, the
- Cost of Fit Out	3	1.6		critical value is higher 0.9
- Total Occupancy Cost	2	2.5		and thus the correlation coefficient is not significant.
Sector: ICT & Media				
Location	**1**	**1**		There is a weak inverse correlation between the
- Branding Image	2	1.9	**-0.2**	two ranks. The correlation
- Access to Market	5	3.5		coefficient is not
- Access to Amenities	3	1.9		significant (n=5, critical
- Access to Public Transportation & Terminal	4	3.7		value=0.9)
- Level of Criminal Rate	1	4		
Lease	**4**	**3.4**		There is no correlation between the two ranks.
- Termination Clause	2	1.0	**0**	There are only two sub
- Payment of Monies	1	1.5		criteria to choose from

Building - Security& Access Control - Responsible Management & Maintenance Team - Maintenance Policy - Cleaning/Housekeeping - Safety Policies & Procedures - Fire Prevention & Protection - After Hours Operation - Toilet Sanitary & Fittings - Air-conditioning & Ventilation - Electrical System & Provision - Modern IT & TelecommunicationBuilding Automation & EMS - Control of Building Services - Passenger Lifts Performance & Control - Car Park Provision & Accessibility - Building Way finding	**3** 3 2 10 16 1 4 14 4 9 7 1 8 14 12 6 13	**3.2** 8.5 4.8 11.1 9.7 6 8.3 10.7 7.5 8.7 10 7.5 8.9 11.1 10 6.4 10	**0.75**	There is a high correlation between the two ranks. The correlation coefficient is significant (n=16, critical value=0.425)
Financial/Cost - Rental Rate - Cost of Fit Out - Total Occupancy Cost	**2** 1 2 3	**1.9** 1.4 2. 2 2.4	**1**	There is a real correlation between the two ranks.
Sector: Oil & Gas				
Location - Branding Image - Access to Market - Access to Amenities - Access to Public Transportation & Terminal - Level of Criminal Rate	**1** 5 4 3 1 2	**1.1** 2.3 2.7 2 3.9 4.1	**0.22**	There is a very low correlation between the two ranks. The correlation coefficient is not significant (n=5, critical value=0.9)
Lease - Termination Clause - Payment of Monies	**3** 2 1	**3.5** 1.3 1.6	**-1**	There is an inverse correlation between the two ranks. There are only two sub criteria to be ranked
Building - Security& Access Control - Responsible Management & Maintenance Team - Maintenance Policy - Cleaning/Housekeeping - Safety Policies & Procedures - Fire Prevention & Protection - After Hours Operation - Toilet Sanitary & Fittings	**4** 13 4 14 16 5.5 2 10.5 15	**3.3** 9.8 8.3 3.6 4.3 5 5.5 9.2 7.8	**0.54**	Although there is a relatively moderate correlation between the two ranks, the correlation coefficient is significant (n=16, critical value=0.425)

- Air-conditioning & Ventilation - Electrical System & Provision - Modern IT & Telecommunication - Building Automation & EMS - Control of Building Services - Passenger Lifts Performance & Control - Car Park Provision & Accessibiliity - Building Wayfinding	5.5 7 3 9 10.5 1 8 12	10.1 9.7 8.8 9.6 11.3 7.8 12.7 12.5		
Financial/Cost - Rental Rate - Cost of Fit Out - Total Occupancy Cost	**2** 1 3 2	**2.1** 1.3 3.3 2	**1**	There is a real correlation between the two ranks.

The ranks of the main criteria chosen by the tenants are compared to the ones generated earlier through the AHP exercise. It is observed that the rank correlations of the two comparison have varying correlation coefficients. For the Finance sector, there is significant correlation for the 'Building' criteria only, as there was no significant correlation for the other three criteria. For the ICT & Media sector, there is a significant correlation for the 'Building' and 'Financial/Cost' criteria. With only two criteria to choose from, there is an inverse correlation between the ranks of tenants and the AHP rank for 'Lease' criteria. There is a non-significant correlation for 'Location' criteria. Finally, for the Oil & Gas sector, there is a similar outcome to that of the ICT & Media sector's. What can be observed are the small numbers - which are less than five (5) - of ranks for two of the criteria to generate a rank correlation exercise. The rank correlation exercise would not give an accurate indication of the correlation between the two compared ranks unless the number of rank comparisons to be made is higher.

In another examination of the differences between the ranks selected by the tenants in the validation exercise, the following comparison is then made. The summary of these two ranks is shown below as Table 6.34.

Table 6.34: Comparison of Ranks – Tenants Preference against AHP ranks

Criteria		Sector Response																							
		Finance/Banking								ICT & Media								Oil & Gas							
		No of Tenants' selection				AHP ranks				No of Tenants' selection				AHP ranks				No of Tenants' selection				AHP ranks			
Main	**Rank/ Weight**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Location	**10-20**																								
	21-30		*2*							*1*															
	31-40	*3*					√			*2*				√				*3*				√			
	41-50									*2*								*3*							
Difference:		**1 rank higher (3/5) than TOS rank**								**No difference**								**No difference**							
Financial /Cost	**10-20**			*1*																*1*					
	21-30		*2*								*5*				√				*5*				√		
	31-40	*1*				√																			
	41-50	*1*																							
Difference:		**1 & 2 ranks lower (3/5) than TOS rank**								**No difference**								**Majority has the same rank. Only 1 rank lower (1/6) than TOS rank**							
Lease	**10-20**			*2*	*2*			√				*2*	*2*				√		*1*	*1*	*4*			√	
	21-30			*1*							*1*														
	31-40																								
	41-50																								
Difference:		**1 rank lower (2/6) than TOS rank**								**1 & 2 ranks higher (3/5) than TOS rank**								**1 rank higher/lower(5/6) than TOS rank**							
Building	**10-20**			*1*	*3*				√			*2*	*1*						*1*	*1*	*1*				√
	21-30										*1*	*1*				√			*2*	*1*					
	31-40		*1*																						
	41-50																								
Difference:		**1 & 2 ranks higher(2/5) than TOS rank**								**1 rank higher/lower(3/5) than TOS rank**								**1 & 2 ranks higher (5/6) than TOS rank**							

What can be observed is that there is a difference of one or two ranks from the selection made by the tenants and the ones generated through the AHP method. Both the ICT & Media and the Oil & Gas sector have displayed almost similar ranks. However, the Finance sector has displayed variation in the ranks of all the four criteria. The difference however is only for less than half of the numbers of tenants in the validation exercise.

6.8.2 Selection of the Suitable Office Space

Below is the summary of the comparison of the selections made by the invited tenants for the suitability of office space at nine (9) office buildings offered to them in the validation exercise. The selection made by these tenants is then compared with the ranks that had been generated by the TOS framework. This is to gauge the accurateness of the developed framework. The summary of the comparison is as follows:

Table 6.35: Selection of Office Space

Name of Building	**Finance/Banking - Ranking by TOS vs Tenants selection**		**ICT & Median - Ranking by TOS vs Tenants selection**		**Oil & Gas - Ranking by TOS vs Tenants selection**		Difference of Choice
	TOS Rank	Tenant Selection	TOS Rank	Tenant Selection	TOS Rank	Tenant Selection	
1. Menara IMC	3	√√√	2	√√√	1	√√√	Equal selection by all sector tenants – no comparison can be made
2. Wisma Goldhill	1	√√√√√	2	√√	3	√	Similar selection
3. Menara Yayasan Tun Razak	1	√√√√	2	√√	3		Similar selection
4. Kompleks Antarabangsa	1	√√√√	2	√√√	3	√√√	Similar selection for the highest rating
5. Menara TH Perdana	1	√√√	3	√√	1	√	The 1st rating by the TOS framework is selected by 2 sectors but not in the tenants'

							validation selection
6. Bangunan KWSP	2	√√√	1	√√√	3	√	The 1st and 2nd rating has similar choices with the tenants
7. Plaza Sentral	1	√√√√	2	√√√√	3	√√	The 1st and 2nd rating has similar choices with the tenants
8. Etiqa Twins	2	√√√	3	√	1	√√√√√√	Similar selection
9. Menara Aik Hua	2	√	1	√√	3		Similar selection

√ - indicates the selection made by tenants (one tick represents one tenant)

It can be observed that there is similar preference given by all the invited tenants for four (4) of the identified building with the ones generated by the TOS framework (shown in the form of rating). They are for buildings no 2, 4, 8 and 9. The selection made by the invited tenants for four (4) other buildings had similar preference for one or two of the criteria (buildings no 3, 5, 6 and 7) while one (1) building (building no 1) has similar choices for all buildings, although the TOS framework generates a different rating for the three (3) different sectors.

6.9 SUMMARY

This chapter presents the results and data analysis of the preliminary and main study. The result of the preliminary study reveals sixty (60) factors that are relevant in the tenants' office occupation in Kuala Lumpur. The factors are identified under four (4) main areas of 'Location', 'Lease', 'Building' and 'Financial/cost'. There are three (3) factors identified under Financial/cost, eleven (11) factors under 'Location', eight (8) factors under 'Lease' and thirty eight (38) factors under 'Building'.

The main part of the study has two phases of methods. The first phase was undertaken to reduce the sixty (60) factors to a more manageable numbers that AHP could handle. Thus, this exercise of factors' reduction reduced the factors to twenty six (26) factors under the four main areas. The three (3) factors identified in the preliminary study under the 'Financial/Cost' remain the same. The eleven (11) 'Location' factors are then reduced to five (5). The 'Lease' factors have been reduced from eight (8) to two (2) factors. Finally, the thirty eight (38) 'Building' factors are reduced to sixteen (16) factors. The second phase, which used AHP to reveal the relative importance of the office occupation factors, attempted to gather three (3) main sectors' tenants of office space in Kuala Lumpur city centre. It reveals that each sector has varying preferences for the factors under the four main areas. An assessment of the mean weight difference and ranks of the three (3) tenants' sectors revealed the significance differences of two (2) sub criteria while another two (2) sub criteria are significantly difference when the comparison is made between large and small organisations.

Finally, having determined the measures for the sub criteria and the relative weights among the three (3) main sectors, the TOS framework is developed and was later validated.

CHAPTER 7

DISCUSSION OF FINDINGS AND DEVELOPMENT OF TENANT OFFICE SPACE (TOS) FRAMEWORK

7.1 INTRODUCTION

This chapter discusses the findings from the current research's preliminary study and main study. These findings, which commenced from the development of the conceptual framework, led to the steps which provided the empirical evidences of the important occupation criteria and sub criteria for office buildings in Kuala Lumpur city centre.

The discussion of findings begins with the development of the concepts of decision making by consumers which led to the rational consumer decision making perspective by emphasising that, with so many factors to choose from, consumers would be limited to behaving rationally and only deciding to choose the ones that fit their selection. With the prospect of multi-criteria selection faced by the consumers, a MCDM technique would be useful to rank the important factors as well as to gather the relative importance of the main and sub criteria of the office occupation decision making. First, the empirical findings revealed the list of the selected important factors from the preliminary study (refer to Section 6.2). The factors that were identified from the literature and past research works were reaffirmed, initially through the expert survey and subsequently through the tenants survey in the main phase of the main study. It was these findings which subsequently provided the basis for the hierarchic structure of the MCDM tool employed in this study, for which Analytic Hierarchy Process (AHP) was used. The findings, along with

predetermined office occupation measures, were used to formulate the decision matrix in the development of the TOS matrix (refer to Section 3.9 and Section 5.3.5).

In view of the findings from the analysis of data of the preliminary study, sixty (60) factors were identified under four main areas of office occupation decision. The main areas are 'Location', 'Lease', 'Building' and 'Financial/Cost' (refer to Section 6.2). To reduce the factors to a number amenable to treatment with AHP, the Principal Component Analysis was performed. This step involved subjecting the factors gathered from the literature and the expert survey to data reduction techniques to assist in the selection of tenants' most important factors. Apart from PCA, Importance Index technique was employed in the selection of factors to be subjected to AHP analysis. The selection of the suitable important criteria is pertinent, as it would be reflected in the outcomes of the AHP analysis (Koo & Koo, 2010). The AHP technique was then performed to identify the relative importance and ranking of the selected main and sub criteria among the selected tenant organisation groups.

Through PCA and Importance Index, the sixty (60) factors as initially identified through the experts survey were reduced to twenty six (26). These resultant factors were then subjected to AHP in order to determine the relative preferences among the main three tenant sectors selected for this study (Section 6.5). AHP reduced the problem to a hierarchy of decision making elements, made pair-wise comparison of possible decision elements, and used eigen-value method to estimate the decision elements and aggregate the relative weights to derive a set of ratings for decision making choices (Murtaza, 2003). The relative weights were then compared among the tenants' profile which include the different sectors and sizes of organisations (Section 6.5.3). The mean weights were also tested for significant differences using ANOVA and t-test. The ranking within each group was then tested for

correlation using the Spearman rank correlation statistic to see whether there were any differences between the rank choices of the different profiles of tenants (Section 6.5.3). These rankings were then tested and validated against the ranking of a group of tenants selected in the validation exercise (Section 6.8).

Consequently, the weights for the different sectors of tenants were used to develop the Tenant Office Space (TOS) framework to be used by office owners/managers or marketing agents for a given available office space. This output of the framework is then compared by a few tenant groups which were selected in the validation exercise (Section 6.8).

7.2 TENANT OFFICE SPACE DECISION MAKING

In answering the first research question i.e. RQ 1: **"**What theories and concepts of consumer decision making underpin tenant office space decision making? (RQ1), a survey of the literature was made. RQ1 was answered through the examination and exploration of the consumer decision-making models, the process of consumer decision making, and consumer preference measurement methods, which include multi-criteria decision making techniques. These theories and concepts were drawn from the perspective of the tenant as consumers of office space. Having identified the consumer decision making theories as the basis of decision making, the MCDM method was adopted as there are multi attributes for consideration in the decision making process. Based on these theories and concepts, the conceptual framework was developed.

The initial examination of the decision making for this study had involved a review of decision making in the real estate context. It was revealed that the behavioural aspects of

decision making in real estate are linked to the human rationality perspectives as proposed by Simon (1978b). In examining property market decision makers' behaviours, several studies have highlighted the limitations of the rational assumption in decision making. The studies by McMaster and Watkins (2000), Leishman & Watkins (2004), Baryla *et al*. (2000), Zumpano *et al*. (1996), Gallimore (1994), Diaz (1990) and Wyatt (1999) have supported the notion that the role and behaviour of real estate actors in the market are different and argued that neither of them are fully rational or have perfect information on the market. They also supported the theory that property is not a homogenous commodity while consumers of space are not homogenous (Leishman *et al*., 2003).

Having recognized the limited rationality in decision making within the property market, the perspective of bounded rationality and satisficing approach by Simon (1993) has been accepted. Other studies by de Bruin and Flint-Hartle (2003), Ross (2003), van Dijk and Pallenberg (2000), North (1990) and Edward (1983) have acknowledged that the real estate decision makers act on imperfect knowledge and limited domain-specific information in their decisions, and are influenced by determinants such as preferences. Having compared the various consumer decision making models, i.e. the Utility Theory by von Nuemann and Morgenstern (1947) and bounded rationality theory by Simon (1957), the bounded rationality theory emerged as the best theory to explain the way the consumer makes a decision in an environment of limited information and with a finite time to make that decision. It is also argued that human agents are limited not only by their rational action but also by their analytical and data processing capabilities (Williamson, 1985). As the consumers are not completely aware of the elements in their decision making, Utility Theory does not provide a realistic decision making paradigm.

Thereafter, the consumer decision making process concepts are examined. First, an examination of the tenants as consumers of office space is made. It has been shown that should tenants - who are not homogenous (Leishman *et al*., 2003) - be treated as consumers of space, their decision making perspective of the product offering would be aligned to gathering the information within the bound of the 'product offering'. Office property as a heterogeneous good can be defined by a vector of attributes that relate to its physical accommodation, location and tenure rights (Dunse & Jones, 1998). In evaluating alternatives, consumers tend to use two types of information, i.e. the list of models which they use to make their selection and the criteria they will use to evaluate each model. Consumer decision rules are often heuristic (Schiffman & Kanuk, 2007). Examining the model of consumer behaviour, the process of decision making involves the elements of problem recognition and information search, judgement and decision making and lastly, post decision process (Hoyer & MacInnis, 2010). In making the decision, consumers are guided by the compensatory and non compensatory rules which can be related to multi-criteria decision making techniques.

Finally, an examination of the consumer preference measurement is made. As the consumer is faced with multi attribute decision choices, the multi-criteria decision making (MCDM) techniques and methods would be the appropriate to be considered. The measurement of consumer preference has been evaluated by various methods, and the most practical application in marketing is the conjoint analysis. However, recent studies have suggested the use of another method - the Analytic Hierarchy Process (AHP) (Koo & Koo, 2010; Helm *et.al.* 2008) as one of the common methods in decision analysis with a wide range of applications (Saaty, 1980, 1993; Schmoldt *et al*., 2001.; Zahedi, 1986; Vargas, 1990; Golden *et al*., 1989).

With the clarifications of these concepts, the conceptual framework is then developed. This framework is then used to guide the investigation of the important factors in the tenant office occupation decision making with the final aim of developing the various sector preferences.

7.3 OFFICE OCCUPATION IMPORTANT FACTORS

The findings from the preliminary study covering the review of the literature and previous studies on office occupation suggested numerous important factors of influence for office occupation are numerous (Section 3.7). Of those factors, the factors that relate specifically to the Kuala Lumpur city centre were determined through expert survey and tenants survey. The results from the preliminary study provided the answer to two (2) out of five (5) research questions (RQ) which covered the initial part of the research.

A preliminary study was conducted to identify the important office occupation factors in Kuala Lumpur city centre. An expert survey was conducted for this purpose. The research question RQ2: "What factors influence office occupation decisions at purpose built office buildings generally in Kuala Lumpur city centre?*"* was answered from the findings of this part of the study.

The literature and past research works provided the list of factors influencing office occupation. In the current study, a rigorous review of the literature and preliminary findings led to the selection of four main areas of office occupation decision (i.e. Location, Lease, Building and Financial/Cost) in the study (Section 3.7). The studies by Pittman & McIntosh (1992), Higgins (2000), Higgins *et al*. (2000), Leishman and Watkins (2004), Leishman *et*

al. (2003), Sing *et al*. (2004), Beltina and Labeckis (2006), Appel-Muelenbroek (2008) and Elgar and Miller (2009) provide the findings on the various aspects of occupation studies.

The current study needs to be differentiated from the previous ones in several respects. The study by Pitman and McIntosh (1992) involved tenants of only two buildings. Higgins *et al* (2000) investigated the micro and macro-economic factors of new space demand, and over a scope that was not limited to the office sector but also covered industrial and retail sectors. The current study bears resemblance to the works of Leishman and Watkins (2004) insofar as it focuses on assessing the importance of factors in determining the choice of office space to be occupied. In the case of the latter study, a discrete office choice model was developed where a logic regression method was used; the current study, however, looks into consumer decision making when dealing with multi-attribute choices. A more recent study by Leishman *et al*. (2003) undertook a survey of office occupiers' preference across sub markets and it was revealed that there are differences in the preference between sub markets. The current research however has limited the scope to the CBD area of Kuala Lumpur. This is in consideration of the work by Leishman et.al. (2003) and Dent and White (1998) which highlighted that the CBD is the most popular location and prestigious area in business activity, where non central location attributes are valued less. The study in Singapore by Sing *et al*. (2004) provided important factors of office attributes but the sample of the occupants was drawn from a single development. The identification of important factors for office buildings in Riga, Latvia in 2006 provided the list of factors for consideration but the study covered only a small sample of buildings. This current study has embarked to cover the top grade office buildings in Kuala Lumpur city centre to provide more exhaustive factors for consideration.

The study by Appel-Muelenbroek (2008) covered the landlord tenant relationship aspects which highlighted the important pull/push factors covering the building and surrounding factors that influence the tenants of two office buildings. The difference between the current study and Appel-Muelenbroek's is the scope, whereby not only the tenant-landlord relationships are considered here but the various aspects of office occupation, namely the 'financial/cost' factors. The study by Elgar & Miller (2009), which focused on the decision behavioural aspect of firms' relocation in Canada, made several findings which are related to this study. There is no direct link between the reasons that make firms decide to move and the attributes that attract a firm to a specific location. As such, this researcher decided to take all considerations for the office occupation location decisions into consideration, and not only from those tenants who wanted to relocate. Elgar & Miller's study also found that 'agglomeration' and 'proximity to supplier' have marginal roles in small and medium size office firm location decisions; and, in the pull and push stages of location decisions, attributes of location are more important than the area and its accessibility. Notwithstanding these findings, the current study attempts to reveal whether these factors are relevant in the Kuala Lumpur office context. It was also revealed in Elgar & Miller's study that office firms are satisficers in their location behaviour. This aspect signifies the important aspect of decision making, which this current study acknowledges. Taking a similar approach of satisficing within the scope of bounded rationality towards decision making, the study has included it within the conceptual framework in determining the tenants' preference for office space.

Several other studies of the needs of and motivation for office relocation have also been mentioned (highlighted in Section 3.5), highlighting the relevant factors for consideration within the various different aspects. They include assessment of future office needs,

behavioural aspects, locational determination and corporate real estate (Dent & White, 1998; RICS, 2005; Van Djik & Pallenberg, 2000; Gibson & Lizieri, 1998; Lizieri, 1997; Leishman & Watkins, 2004; Edward & Ellison, 2004).

By identifying the major themes of i) location, ii) physical provision, i.e. the building attributes, iii) financial/cost, and iv) lease arrangements, this study identified the various factors under each theme.

Numerous studies have mentioned the location factors pertaining to office occupation. Section 3.7.1 summarised these studies that covered various aspects namely the classical and recent approaches related to location decisions. To examine the financial and cost implication factors, Section 3.7.2 provided the overview of previous studies on the theme. The 'financial and cost' factors seem to be mentioned in various aspects, but essentially covered the element of cost in the office occupation decision. Section 3.7.3 attempted to provide a comprehensive list of factors relating to the physical aspect of office occupation. This section tried to include as many factors that have been considered for office occupation as possible. Studies by Douglas (1996), Bottom (1997), Ho (2005) provided the scope of physical consideration when assessing occupiers' requirement for office space. Other studies also provided the factors for consideration that reflect the current needs, which include the latest ICT technological requirements. The lease arrangement features and factors of consideration for office occupation were summarised in Section 3.7.4. In considering that some lease terms are tied up to the National Land Code 1965, the appropriate factors were taken into account along with the others that were mentioned in the earlier studies.

Having identified one hundred and twenty eight (128) factors from this literature, it was necessary to identify the relevant criteria to be used in the Kuala Lumpur office market context. Thus, an expert survey was conducted to ensure that only the ones relevant within the Kuala Lumpur office market were selected. This led to the findings that answered the second research question.

From the selection of the important factors by the invited experts, the one hundred and twenty eight (128) factors were reduced to sixty (60) factors using Importance Index approach. The factors that were selected are as follow:

Location: Under this main category, eleven (11) factors were identified as important. These identified factors are similar to the ones mentioned by Dent and White (1998), which highlighted that occupiers' locational determinants were 'proximity to customers', 'motorway network', 'public transportation', 'professional area', 'locational prestige', 'shops and restaurants'. These factors were also mentioned in the studies by Higgin (2000), Sing *et al*. (2006), Coffey and Sherman (2002), Wyatt (1999), Louw (1998), Van Dijk and Pallenberg (2000) and Jakobsen and Onsager (2005). The selected factors that were not considered important by the experts are the factors mentioned in the neo classical locational approach by Krugman (1995), where 'transportation cost', 'labour cost' and 'market size' are the main considerations. This is also the case with the study by Frenkel (2001), where some of the factors mentioned in the study were not selected in the current study survey. These include 'proximity to cheap labour, investors and government'. Other sub factors that were not considered as important are 'proximity to sub-centres' (Pen, 1999), 'market size' (Dunning & Norman, 1987; Hoffman *et al.*, 1990), 'corporate headquarters' (Dunning & Norman, 1987), and 'convenience to residential area' (Mazzarol & Choo, 2003; Karakaya

& Canel, 1998, Keeble & Tyler, 1995). From the selected location factors, it can be concluded that the location choice models as proposed by the earlier studies by Ball *et al*., 1998; Evans, 1985; Goddard, 1975 are not considered in the study context. The agglomeration factors (as emphasized by Daniel, 1991; Sing, 2006; Coffey and Shearmur, 2002, Wyatt, 1999) are still considered important considering that Kuala Lumpur city centre is currently the centre of commercial activities for Kuala Lumpur and Malaysia. Though it has been highlighted that the advent of ICT may reduce the need for the factors of agglomeration as highlighted by Gibson and Lizieri, 2001, and Sing, 2005, these factors are still important in the selection of office space in Kuala Lumpur city centre. This presumption is agreed upon by Bollinger *et al*., 1998 who argued that ICT could reduce information cost but could not replace the face-to-face interaction. The importance of face-to-face activity for office productivity is well documented in the literature and has been identified as the main cause for office agglomeration economies (Lichtenberg, 1960; Robbins & Terleckyi, 1960; Goddard, 1973;).

Financial/Cost: Under this main category, three (3) factors were selected. They are similar to the factors that are mentioned in the earlier studies by Dow & Porter (2004), Haley & Kampa (1989) and Gibson (2000). The ones that were not selected include the ones highlighted by Dixon (2009) and Dow and Porter (2004) to be cost considerations other than rental. It could be observed that the selected factors are the ones related to the concerns when the status of occupancy is confirmed by a tenant.

Building: Under this main category, thirty eight (38) factors were identified. These factors are a combination of the major themes, i.e. 'building presentation', 'building management', 'space functionality', 'services', 'access and circulation', and 'amenities'. Most of the

factors identified under ‘building presentation signifies the importance of appearance and presentation. Most of the factors under ‘building management’ were identified; which reflects the importance of these factors for office occupation in Kuala Lumpur. As to the factors under ‘space functionality and atmosphere’, the selected factors relate more to space usage features rather than space provision features such as riser space or adequacy of natural lighting. The selected factors under ‘services’ relate to the enabling provision to conduct activities within the space and thus, the majority of the factors within this theme are selected. As to the factors under the theme of ‘access and circulation’ and ‘amenities’, only the ones that assist the tenants with regard to circulation and convenience are selected, which include ‘lift performance’, ‘car park provision’ and ‘F & B outlets’.

The overall building factors are those which relate mainly to the occupation rather than assessing the performance, as mentioned by Douglas, 1996. Though the design and appearance were highlighted to be important by the study by Bottom *et al*. in 1998, these factors do not seem to be of greatest importance in the Kuala Lumpur office occupation context. The factors that have been listed in Ho *et.al.* (2005) are considered to be the relevant factors of consideration. In the context of building quality, the internal and external specification pertaining to structure and design are not given important consideration, unlike the ones pertaining to management and services. With the advent of IT, the building specifications to meet its increasing demand have been selected as important. This phenomenon has been highlighted by Spurge and Almond (2004), who discussed the current needs for IT accessibility.

Lease: The selected factors under this category mainly concern with the occupation issue - mainly payment and lease terms. Other factors that relate to the security of tenure, such as

termination clause and renewal terms, are also a major concern. It can be said that tenants are considering security of occupation to cover the term of their business activities, as in the use of the office space.

Overall, the expert survey reveals that there are varying degrees of importance placed on various identified factors. Through the ranking it is observed that 'rental rate' was placed as the most important factor followed by 'location' and 'physical features'. It is also observed from the ranking of all the factors that 'building management' and 'financial/cost' are among the top ranked factors in terms of importance. The 'space functionality & atmosphere' factors along with the ones under location factors are ranked lower than the other factors.

7.4 TENANTS' PREFERENCE OF IMPORTANT FACTORS

The research question RQ3: "What factors influence office occupation decisions by tenants at purpose built office buildings in Kuala Lumpur city centre?" shall be answered through the tenant survey conducted in the first part of the main study, which used factors identified from the preliminary study described above.

The summary of the analysis of the main study results provided the answer to three (3) out five (5) research questions (RQ) which covered the quantitative part of the research. The fourth and fifth research questions (RQ4 and RQ5) would be answered in the later part of the main study, which subsequently led to the development of the TOS matrix.

The research question RQ4: "What are the factors' relative importances which influence the office tenants' occupation decision at Kuala Lumpur city centre that portray the preferences of the main sectors at purpose built office buildings?*"* was answered from the findings of the subsequent phase of this main study.

The initial sixty (60) factors identified by the experts under the four (4) main areas i.e. Location, Lease, Building and Financial/Cost) were reduced in the selection of the important factors by tenants in the Phase One (1) in the main study. The factors were then reduced to twenty six (26) factors with the application of the Principal Component Analysis (PCA) and Importance Index scoring. These important factors provided the platform to undertake the Multi-criteria Decision Making (MCDM) method analysis in which Analytic Hierarchy Process (AHP) was conducted in this study. These two (2) methods were used to answer the RQ3 and RQ4. Having determined the relative importance and ranking of the important factors by the three (3) major tenants' groups for office buildings in Kuala Lumpur city centre, the framework for office space preference by these three groups shall be determined. This is to answer the final research question, i.e. RQ 5: "What is the multi-criteria decision making framework which will eventually assist in the formation of an assessment tool for available office space at purpose built office buildings in Kuala Lumpur city centre?"

7.4.1 Identified Important Factors by Tenants

The findings of the tenants' survey are gathered through the Principal Component Analysis (PCA) and the Importance Index calculation. In identifying the important factors through PCA, the reliability measure through the Cronbach's alpha score of between 0.8 and 0.9 suggests that the scale scores are reasonably reliable. Further, the Bartlett's test of

sphericity for each main criterion portraying the values of < 0.05 (which is significant) and with KMO value of 0.8 to 0.9, indicate that the correlation between the attributes is adequate for the principal component analysis. From the PCA procedure, the sixty (60) factors/sub criteria identified earlier are reduced to twenty six (26) factors/sub criteria.

It can be observed that the main attributes under the main headings of Lease Features and Financial Considerations have only one explained factor while those under the main headings of Location and Building have more than one factor explained. This suggests the various underlying dimensions that the factors are measuring. For Location, the three factors can be described as agglomeration, accessibility and environment. The attributes identified under each factor however can be easily identified to represent the location criteria. Under the Building heading, the five factors can be described as space provision, management, features, services, and accessibility and convenience. Should the attributes under each factor be grouped under one common name, they can easily be distinguished to represent the building elements.

The Importance Index ranking had assisted to reconfirm the earlier PCA findings by identifying the top important factors. It is observed that the criteria under the building main criteria achieved higher ranking in comparison to the financial consideration aspects. This is contrary to the literature and findings from past research on the building elements for quality consideration in Malaysia, in which the design and space provision aspects had not been given high priority by the various stakeholders (Adnan *et al*., 2009). A possible explanation is that this reflects the fact that the office buildings selected in this study are prime high-rise office buildings with high concerns for the safety, security and convenience of tenants' operations. Since the financial aspects were thought to be also of concern, rental

rate is also ranked as one of the most important factors. The location factor has an almost similar ranking range, which relates to the fact that all the office buildings indicated in the study are located in the central business district (CBD). Thus they would not have much variation of preferences when compared to other office locations in Kuala Lumpur. The criteria with scores of 80 or more on the Importance Index were then reconciled against those that had been selected through the PCA method to produce the set of factors that represent the combined output of the two procedures.

In comparing the individual outputs from PCA and the Importance Index, it was observed that some factors had not been identified earlier in the PCA but had been included in the combined output because they ranked high on the Importance Index. On the other hand, there were also factors with high loading values in PCA that had been excluded on the basis that they scored low on the Importance Index. Nevertheless, all the factors that had been selected in the final array have a considerably high loading value of more than 0.6 (which is considered high as suggested by Kaiser (1974) and Kinnear and Gray (1994). In general, the factors that are given the higher priority relate to the building management and services.

From the final array of factors (Section 6.4.3) selected from the tenant survey, several observations can be made. The financial/cost factors remain important to tenants. As to the location factors that were selected, it can be said that they relate to the concerns of accessibility, especially to public transportation, amenities and market. The proximity to other supporting services, clients and major trunk roads are no longer placed as having the utmost importance, though this was observed by Wyatt (1999) to be significant by the financial and professional firms. The accessibility means can be dealt with through better infrastructure development and the advent of ICT. The concerns on traffic conditions and

accessibility by private vehicles are no longer considered important by tenants as the means of accessibility is addressed by the improvement mentioned earlier. It is also anticipated that, as improvements to the public transportation system improvement are currently being addressed, this could be another reason for the low ranking of the traffic accessibility factor. The announcement of the proposed Mass Rapid Transit (MRT) project in June 2010, which was approved by the government of Malaysia in December 2010 (www.mrt.com.my), would enhance the public transportation system in Kuala Lumpur.

As to the lease factors, the two selected as important are particularly related to the monetary and security of tenure concerns, that are the payment terms and termination clause. As the current existing tenancy agreement clauses for office leasing are almost standard in Malaysia, the tenants are mainly concerned about finding out the monetary arrangement and exiting terms. This aspect was earlier indicated in the study by Louw (1998) as part of the financial and contractual aspects that are related to the cost of accommodation.

As to the building factors, the ones that have been selected relate to the management and services of the physical provision of the space. There are some factors related to access and circulation covering aspects of car park, lift performance and wayfinding. The building presentation and space functionality and atmosphere have been placed as less important than the management and services aspects. As mentioned earlier, this observation is possible as the office space covered in this study is within the premier office buildings in Kuala Lumpur city centre and, as such, the tenants appreciate the management and services aspect of the office provision.

The findings of Phase One (1) of this study which provided the answer to RQ 3, are then adopted to lead to provision of the answer for RQ 4.

7.4.2 Relative Importance of Factors by Three (3) Sectors of Office Tenants

The four (4) main criteria and twenty six (26) sub criteria that were selected as important are then used to determine the relative importance among the three (3) identified tenants' groups (see section 5.5). The criteria and sub criteria (redefined from areas and factors from earlier section as explained in Section 6.4.3 are:

1. Location – Image/Branding, Access to Amenities, Level of Crime, Access to Public Transportation & Terminal and Access to Market
2. Lease Features – Payment of Monies, Termination Clause
3. Building – Fire prevention & Protection, Security & Access Control, Safety Policies & Procedures, Air Conditioning & Ventilation Systems, Responsible Management & Maintenance Team, Electric System & Provision, Toilet & Sanitary Services, Modern IT & Communication Systems, Cleaning/Housekeeping, Maintenance Policy, Car Park Provision & Accessibility, Control of Building Services, After Hours Operations, Building Automation, Building Wayfinding and Passenger Lifts Performance.
4. Financial/Cost – Rental Rate, Total Occupancy Cost, Cost of Fit Out

The findings for the relative importance of the above criteria and sub criteria were determined through the Analytic Hierarchy Process (AHP), which used pair-wise comparison across the entire main and sub criteria. By making a comparison across all sectors and categories of tenants, the assessment of the mean weights among all the comparison are determined as follows:

7.4.2.1 All Categories of all Three (3) Sectors

The findings from the AHP analysis reveal that all the three sectors' tenants - regardless of size - have chosen 'location' to be the most important main criteria, with a weightage of 34.3 per cent. With a slightly lower percentage of 31.2, the 'financial/cost' is the next important main criteria. The other two main criteria, which include 'lease' and 'building', were given weights of 17.1 per cent and 17.4 per cent respectively.

The selection of 'location' as the most important criteria confirms the work of Dent and White (1998) which identified 'location' as a very important factor for business activity. From the behavioural perspective of decision making, it can be concluded that the findings confirm the work of Leishman and Watkins (2004) which revealed the importance of other factors besides 'rent' and 'location', as stated by the neo classical economic analysis. From the selection of important 'location' sub criteria, with the 'level of criminal rate' having the highest weight and 'access to market' having the lowest weight, it can be concluded that the preference for agglomeration factors has decreased for the three (3) sector groups. The finding reveals that the three (3) sector groups differ from the findings of the survey conducted for all tenants (Section 6.4) where 'image' and 'access to amenities' were chosen as more important than the 'level of crime'. Thus, the works of Daniel (1991), Sing et.al. (2006), Goddard (1973), Coffey and Shearmur (2002), Wyatt (1999) that considered the significance of the commercial centre for agglomeration, have less significance for the choice of office space by the three (3) sectors. The advent of ICT may reduce the need for the factors of agglomeration (as highlighted by Gibson & Lizieri, 2001 and Sing, 2005). Though this finding reduces the presumption put forward by Bollinger *et al*., 1998 who argued that ICT could reduce information cost but could not replace the face-to-face interaction; accessibility to the market is still an important criteria in office preference for

these tenants' groups. The reduced need is also reflected by the preference of tenants for 'access to public transportation & terminal', which was selected to have the second highest weight after the 'level of crime rate'.

The sub criteria under 'Lease' have almost equal weight, which reflects the concern over the cost and security of tenure of occupation. The sub criteria under 'Building' that were chosen as having the three highest weights are 'responsible management & maintenance', 'modern IT & telecommunication' and 'fire prevention & protection'. These sub criteria cover the aspects of management and services as mentioned in the studies of Blake (2003), BRE Research (2000), Babcock (2003), Clift *et al*. (1996), Ho *et al*. (2005), Baum (1993) and Hartkopf *et al*. (1992). This can be seen as the increasing need for better services and infrastructure especially to accommodate for the higher specifications for IT & communication needs by the three sectors' tenants. In meeting the business environment of these service-driven sectors, sophisticated needs will be have to be met. These selections seem to be similar to the important factors that were chosen by all tenants, which were highlighted in Section 6.4 earlier.

The sub criterion that was given the highest weight under 'Financial/cost' is 'rental rate'. Thus, this finding reflects the earlier studies of Dent and White (1998), Dow and Porter (2004), Haley and Kampa (1989), and Gibson (2000), which emphasized the importance of financial factors, especially the ones that relate to cost of occupancy, which include rental rate. This aspect is also shown to be significant, as the overall choice given by the three sectors for the sub criteria which have the highest global weight are rental rate and total occupancy cost.

For the overall standing of all the criteria that have been ranked by the three sectors' tenants according to the global weights, the sub criteria under the 'Financial' criteria was ranked 1st, 2nd and 8th. On the other hand, the location sub criteria were ranked 3rd, 4th, 5th, 6th and 7th, accounting for the top eight of the top ten sub criteria. The other two sub criteria are within the 'Lease' criteria. No 'Building' sub criteria were ranked in the top ten placing. These findings are somehow different from the earlier finding of the tenants' survey (Section 6.4). The Building factors seem to be ranked with the highest Importance Index score. Apparently, the preference of all the combined sectors on the 'Building' criteria is different from the three sectors' groups, which have placed lesser preference on these factors.

7.4.2.2 Large and Small Organisations of the Three (3) Sectors – Overall Comparison

The findings of the relative weights between the large and small organisations of the three (3) sectors of tenants have revealed that different preferences are placed on the highest weight main and sub criteria. The large organisations have placed the highest weight on 'Financial/Cost' criteria followed by 'Location', 'Lease' and 'Building'. On the other hand, the small organisations have chosen 'Location' followed by 'Financial/Cost', 'Building' and 'Lease'. The small organisations' location preference could be explained by the earlier work of Wyatt (1999), which indicated that the medium sized and large organisations are able to separate business function from face-to-face needs. However, the small organisations do not need to separate these functions and tend to be centrally located. The preference for the location criteria by the smaller organisations however does not explain the earlier findings by Elgar & Miller (2009) from which he mentioned that agglomeration has a marginal role for small and medium office firms. His study was focused purely on

relocation decision; not on the occupation decision, which would not explain the current findings.

In assessing, the local weights of main criteria for each type of tenants, i.e. large and small organisation, there are varying weights placed on the attributes. For 'location', the large organisations have placed 'access to public transportation & terminal' with the highest weight (24.1 per cent) and given the lowest weight to 'access to market' (11.2 per cent). On the other hand, the small organisations have placed 'level of criminal rate' (29.1 per cent) and the lowest weight on 'branding image' (15.4 per cent). Both large and small organisations have placed 'termination clause' with higher weight over 'payment of monies terms'. As for the 'Building' sub criteria, the large organisations have placed the highest weight on 'modern IT & telecommunication' (9.4 per cent) and the lowest weight on 'cleaning/housekeeping' (4 per cent). The small organisations have placed the highest weight on 'responsible management & maintenance team' (10 per cent) and the lowest on 'building wayfinding' (3.7 per cent). For 'Financial/cost' criteria, both sectors have placed 'rental rate' with the highest weights and the 'cost of fit out' with the lowest weight.

It can be observed that both the large and small organisations of the three sectors tend to reflect the behaviour of the overall three sectors' selection according to the local weights of the sub criteria.

In assessing the global weights of the criteria, the large organisations have ranked 'total occupancy cost' as the top sub criteria while the small organisation have ranked 'rental rate' as the top sub criteria. In addition, the small organisations have placed similar ranks for the top two sub criteria to the ones placed by all the overall categories. When assessing

the lowest five (5) ranked criteria, the weights that are placed for these criteria by the small organisations are almost similar to overall three sectors' ranking.

In general, it can be observed that there is a high rank correlation coefficient between the two categories. However, there is a significant difference in two of the sub criteria when the means are compared for significance testing. The large organisations placed a high priority for 'cost of fit out' under the 'Financial/Cost' criteria. This could be due to their financial concern regarding the cost of fit out. According to the ranking of the 'Financial/Cost' sub criteria, the large organisations have ranked the three sub criteria as No 1, 2 and 3 respectively. On the other hand, the small organisations have placed more priority on 'access to market' under the 'Location' criteria. This reflects the concerns and needs of the small organisations of reaching their customers in the business operations.

7.4.2.3 Three (3) Sectors Comparison

When the general comparison is made between the three sector groups on the main criteria, there is a different preference for the top criteria between them. The Finance/Banking sector has chosen the 'Financial/cost' criteria, unlike the other two sectors, which have chosen 'Location'. There seems to be a varying preference for the lowest preferred criteria. Both the Oil & Gas and Finance/Banking sectors have placed the lowest weight on the 'Building' criteria, whereas the ICT & Media sector has placed the 'Lease' terms as the lowest.

When comparing individual sectors, the various differences of the weights being placed on each of the sub criteria under each criterion can be observed. There are varying preferences portrayed by the three sectors on each of the criteria. For 'Location', the Finance sector has

placed the highest weight on ‘image/branding’, while the ICT & Media has placed ‘level of criminal rate’ as the highest. The oil and gas sector has placed ‘accessibility to public transportation & terminal’ as the highest. The findings reflect the nature of business of each sector which value different criteria and sub criteria. It is possible that the finance sector in the central location values the locational prestige, as stated by Dent and White (1998). As for the ICT & Media sector, the preference for ‘level of criminal rate’ might reflect concern for the security of its operations, which may extend after hours. As for the Oil and Gas sector, preference for ‘public transportation & terminal’ verifies the accessibility need, as confirmed by earlier studies by Sing *et al*. (2006) and Dent and White (1998).

As for the ‘Lease’ criteria, only the Finance sector has placed ‘payment of monies’ higher than ‘termination clause’. This reflects their concerns regarding the monetary arrangement of payment to meet their operation. Both the ICT & Media and Oil & Gas have placed ‘termination clause’ with the higher percentage. On the other hand, the other two sectors are more concerned with the security of tenure of the space. As for the ‘Building’ criteria, the Finance sector has placed ‘responsible management & maintenance’ team as the top building sub criteria. The ICT & Media Sector has placed ‘modern IT & telecommunication systems’ with the highest weight, while the Oil and Gas sector has placed ‘passenger lift performance & capacity’ highest. The preferences for the ‘Building’ sub criteria reflect the nature of the operations whereby each of the sectors has a different focus, especially the ICT & Media sector which requires up-to-date ICT infrastructure and facilities in order to operate. Finally, when assessing the local weights of the sub criteria for the three (3) sectors, all of them have placed ‘rental rate’ with the highest weight and the ‘cost of fit out’ with the lowest weight.

When assessing the global weights and ranks of the two sectors separately, these findings were observed:

a) Finance and ICT & Media Sectors

The correlation coefficient between the ranks of the sub criteria of both the Finance/Banking and the ICT & Media sectors is high. However, there are slight differences placed on the weights of the sub criteria by the Financial and ICT & Media sectors for the top ten ranks. Both the sectors have placed two of the 'Financial/Cost' sub criteria as their top two ranked. The other top ten ranked sub criteria within the Finance sector are within the Location, Lease and Building sub criteria. Within these sub criteria, only one sub criteria from the Lease and Building criteria were in the top ten ranking. On the other hand, there are more Lease and Building sub criteria in the top ten ranking of the ICT & Media sector as there were less of the Location criteria. Thus, it can be observed that the ICT & Media sector has a lower preference for the Location sub criteria than the Finance sector. Both sectors have the Building sub criteria that are ranked as the lowest three. It can then be said that the ICT & Media sector has considered other factors than location in their office space top preference.

b) Finance and Oil & Gas Sectors

From the high rank correlation coefficient between the two sectors, there is a real correlation of the ranks of the sub criteria. When the weights of the sub criteria are tested for significance difference, there is one sub criteria that is significantly different. The sub criteria is 'passenger lift capacity & performance', which is preferred by the Oil and Gas sector. This preference is reflected by the placement of this sub criterion in the top ten ranking of the Oil & Gas sector. While the Finance sector prefers more of the Locational

sub criteria, the Oil & Gas sector has two of the Building sub criteria in the top ten ranked selection. Thus it can be said that the Oil & Gas sector has more preference for Building sub criteria. Both sectors have chosen the Building sub criteria as the bottom three ranked sub criteria.

c) ICT & Media and Oil & Gas sectors

The high correlation coefficient reflects that there is a correlation between the two sectors' ranks of all the sub criteria. There is one sub criteria that is significantly different when the significance difference testing was made across the mean of all the sub criteria. The sub criterion is 'access to public transportation & terminal', which is preferred by the Oil and Gas sector. In assessing all the sub criteria ranks, it can be observed that the Oil & Gas sector also prefers the Locational criteria as four out of the five sub criteria are in the top ten ranking. The Oil and Gas sector has only one building sub criteria that is ranked in the top ten selection. Both sectors have chosen the Building sub criteria as the bottom three ranked sub criteria.

What can be observed from the comparison of the three sectors is the preference of each sector over the choice of the highest and lowest weight and rank among the criteria and sub criteria. Thus, the findings confirm the work of Leishman and Watkins (2004), Sing *et al*. (2004) and Greenhalgh (2007) that the decisions on office occupations are made in different ways and also depend on various factors, which include type of organisations, size, corporate culture and structure. Dent and White (1998) had earlier highlighted the importance of the research on occupiers' needs, as currently there is a changing working practice from the organisations' operations' perspective.

7.5 DEVELOPMENT OF A TENANT OFFICE SPACE (TOS) FRAMEWORK

The discussion begins with major findings of the AHP method used, which was directed to answer the fourth research question (RQ4): "What are the factors' relative importances which influence the office tenants' occupation decision at Kuala Lumpur city centre that portray the preferences of the main sectors at purpose built office buildings?"

The findings from the AHP method is then adopted for the further development of the Tenant Office Space (TOS) framework to answer research question (RQ5): "What is the multi-criteria decision making framework which will eventually assist in the formation of an assessment tool for available office space at purpose built office buildings in Kuala Lumpur city centre?"

The development of the framework is done through two steps. First, the application of the measurement that was determined by the work of earlier research on the classification of office buildings (Daud *et al*., 2011) and the confirmation gathered from expert tenant representative as stipulated in Section 5.8.1 is adopted. Second, the weights determined from the AHP method for each respective tenant's sector are then applied to complete the structure of the TOS assessment framework. The assessment of the most suitable tenant to occupy the available space at the given office building can only be made when the appropriate building score is completed along with the weights for each respective sector. The following is the discussion of the appropriateness of the framework and assessment of the framework when it is operationalised.

7.5.1 Identification of Important Factors

The application of the Importance Index was employed to reduce the one hundred and twenty eight (128) factors relating to office occupation identified by the literature and the panel of experts in the preliminary survey. From the sixty (60) important factors identified by the experts, the Principal Component Analysis (PCA) and Important Index were adopted to reduce the factors identified in the tenants' survey. The relevant criteria used to measure the reliability and validity, such Cronbach's Alpha value, and the use of face validity in the experts' survey in these surveys were found to be satisfactorily acceptable (see Sections 6.2 and 6.4).

7.5.2 Assessment of Relative Importance of Factors

The selected important factors were then adopted in the AHP method to ascertain the relative importance of the factors under the four main areas (redefined as main criteria and sub criteria in the AHP exercise). The reliability of the choices of criteria when the pair-wise assessment of criteria is made has been acceptable. This is accounted for by the determination of a reliability ratio of not more 0.1 for all the assessment.

7.5.3 Assessment of the Building Measurement for the TOS Framework

The building measurement assessment is derived from an earlier study to classify office buildings in Malaysia (Daud *et al*., 2011; Adnan *et al*., 2009). These measures are then reconfirmed with the panel of tenants' organisations' experts who are familiar with the assessment of the measures for their office occupation decision making. Six (6) out of twelve (12) experts from the three (3) tenant sectors that were invited provided the reconfirmation of the measures. Thus, the measures are used in the framework by specifying the score of their availability.

7.5.4 Assessment of the Tenant Office Space (TOS) Framework

The TOS framework consisting of the building measurement component and the tenants' sector weights are then tested by the validation exercise, as shown in Section 6.8. It is observed that, although the TOS framework score does not accurately provide the exact identification of suitable tenants, the framework has provided an almost accurate identification of suitable tenants' groups for the chosen office buildings in the validation exercise.

7.6 SUMMARY

The limited rationality within the property market by decision makers supports the notion that the actors are different. It is also noted that property is not a homogenous commodity and consumers of space are not homogenous (Leishman *et al*., 2003). Having recognised the limited rationality in decision making within the property market, the perspective of bounded rationality and satisficing approach by Simon (1993) has been accepted.

While office space is viewed as a product with the tenants as the customers, the consumer preference measurement from the consumer decision making perspectives involves choosing a method that is most practical. Analytic Hierarchy Process (AHP), a technique within the Multi-criteria Decision Making Methods (MCDM) is chosen as it deals with the multi attributes of office space in the tenant decision making process and has been suggested in recent studies in consumer preference (Koo & Koo, 2010; Helm et.al., 2008). The important factors in the tenant office space decision making process in Kuala Lumpur was identified through the literature review, experts' survey and tenant survey. The identified factors in the Tenants' survey comprise twenty six (26) sub criteria under four (4)

main areas. They are ‘Location’, ‘Lease’, ‘Building’ and ‘Financial/Cost’. These factors highlighted the preference of the tenants in all sectors which have chosen the ‘Financial/cost’ as the most important factor. The chosen factors within ‘Location’ relates to accessibility to ‘public transportation’, ‘amenities’ and ‘market’. The chosen ‘Lease’ factors relate to monetary and security of tenure concerns while the ‘Building’ factors relate to the management and services of the physical provision of the space. Apparently the building presentation and space functionality factors have been chosen to be less important. In the development of the Tenant Office Space (TOS) framework, the relative weights of importance of the office factors preference of the current three (3) main sectors of tenants’ in Kuala Lumpur were gathered through the AHP process. The statistical analysis of t-test has shown significance differences of the mean weights for a few of the sub criteria (factors) between the sectors and categories of tenants. Thus, the size and the different sectors of tenant’s organisations have significant difference in terms of preference for these sub criteria (factors) namely ‘Cost of Fit Out’, ‘Access to Market’, ‘Passenger Lift Performance & Capacity’ and ‘Public Transportation & Terminal’. However, the mean weight comparison among the various sectors and sizes do not have significant differences for majority of the sub criteria (factors). The Spearman rank correlation among the sub criteria has shown high correlation between the ranks of the sub criteria between sectors.

Consequently, the measurement of sub criteria (factors) and the mean weights for the respective tenant sector form the tenant office space (TOS) framework. The identified measures for the sub criteria and the relative mean weights for each sub criteria (factors) as preferred by the three (3) main tenant sectors form the assessment tool for suitable tenants for a particular office space at purpose built office buildings in Kuala Lumpur city centre. The TOS framework was validated with independent tenant sectors experts using rank

correlation, ranking of the main criteria and office space selection for selected office buildings. Though the rank correlations do not show the high correlation among the comparison, the selection of ranks for the main criteria show small variation between the selected ranking. The office space selection by the tenant revealed almost similar selection with the ones generated by the TOS framework. Thus, the TOS framework is able to make an assessment of the suitable tenants for a particular office space with the identified building attributes.

CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

There have been many studies on factors that influence office occupation in different contexts and settings. They cover a range of areas related to locational decisions, corporate real estate, building performance, relocation as well as tenant retention aspects. Regardless of these many studies, research is still limited relating to the factors that influence tenants' office occupation decision making, primarily in the Kuala Lumpur office market.

In the context of Malaysia, the performance of the office market has been soft with supply outstripping demand (C H Williams, 2011). Thus, the office market in Kuala Lumpur remains a tenants market with large amounts of space available for leasing. By the third quarter of 2011, the existing supply of office space in Kuala Lumpur was 6.46 million sq. m. (69.59 million sq. ft.) and a future supply of 2.7 million sq. m. (29.11 million sq. ft.). Out of the space, 5.08 million sq. m. (54.7 million sq. ft.) was occupied. This leaves 1.37 million sq. m. (14.89 million sq. ft. or 21.3% of the total space vacant (Fernandez, 2012; PMR 2011).

This empirical study on factors influencing tenants office space decision making represents an initiative to assist the stakeholders in the provision of the office space that meets the demand of the tenants' market as well as to improve the occupancy at office buildings. In doing so, it could in turn improve the provision of office space, especially in a soft office market outlook.

A thorough literature review was conducted to identify the spectrum of issues that pertain office occupation, with particular focus on factors that influence decision making in various settings - including locational decisions, corporate real estate decisions, building performance considerations, and retention and relocation decisions. The findings show that different sets of factors apply to different settings. Based on the literature review, the factors that relate to office occupation were singled out and subjected to reconfirmation in this study. In this study, the scope is limited to the decision making stage of tenants' pre occupation stage - a stage that has to consider the various factors before the lease arrangement is finalised.

As suggested in Section 8.2, the objectives of this study have been achieved. Section 8.3 discusses the theoretical and practical contributions of the study. Following this is Section 8.4, which takes a look at the recommendations for future work as the possible next step from the current study.

8.2 CONCLUSION OF MAIN FINDINGS

The conclusion to the main findings is geared to the provision of answers to the research objectives of this study presented in the next two sub-sections.

8.2.1 Development of the Tenant Office Space Decision Making Conceptual Framework - Main Findings of the Preliminary Study

The first two (2) objectives (RO1 and RO2) were achieved through the preliminary phase of this study.

The first objective (RO1): *"*To develop a conceptual office occupation decision making framework for Kuala Lumpur city centre through the synthesis of various theories and concepts*"* was achieved with the examination of decision making theories and behavioural studies in relation to real estate from the literature. With a special focus on office occupation studies, these concepts were then adopted to develop the conceptual framework for tenant office occupation decision making in Kuala Lumpur city centre. Initially, the behavioural studies in real estate decision making were identified. Subsequently, the consumer decision making concepts and process were examined leading to the identified consumer decision models which are relevant. The models by von Nuemann and Morgenstern (1947) and Simon (1957) were explored and the concept of satisficing was adopted in the framework. The knowledge on how to measure consumer preference led to the identification of methods to be used. Since the literature had identified that the various factors for office occupation decision making falls under four major headings of location, lease, building and financial/cost, the multi-criteria decision making (MCDM) methods were identified as the relevant method to use. Subsequently, the literature search revealed one hundred and twenty eight (128) factors for office occupation decision making consideration under the four major headings.

The second objective RO2: *"*To establish relevant factors influencing general office occupation decision making at purpose built office buildings in Kuala Lumpur city centre" was achieved through an expert survey. The survey drawn from experts who have dealt with marketing and leasing of space - comprising consultants and office buildings owners/managers - reduced the selected factors from the literature survey to sixty (60). The findings in the preliminary study were pertinent as they gave an overview on the office

occupation decision making from the consumer behaviour perspectives. By focusing the decision perspective on satisfying and bounded rationality, the study was drawn to examine the selection of the various factors affecting the office occupation decision. The development of a conceptual framework provided a guide for the derivation of the factors influencing tenants' office occupation decision making. From the large number of factors that were identified to influence office occupation decision making by tenants, it was necessary to select the relevant factors in a Kuala Lumpur city centre office occupation context. With this respect, the experts survey was employed to provide the suitable factors which would be used in the tenants survey, which is discussed in the next sub-section.

8.2.2 Development of the Tenant Office Space (TOS) Framework

8.2.2.1 Main Findings of the First Phase of the Main Study

The third, fourth and fifth objectives (RO3, RO4, RO5) were achieved in this phase of this study. The achievements of findings for RO3 and RO4 lead to the achievement of RO5.

The third objective (RO3): "To identify the important factors influencing tenant office occupation decision making at purpose built office buildings in Kuala Lumpur city centre" was further achieved through the following main findings of the tenants' survey. The twenty six (26) sub criteria selected by the tenants under the four main headings/criteria were eventually being adopted to derive the relative importance the selected tenant sectors for the achievement of the RO4.

The first identification of the factors influencing tenants' office occupation decision making was from the preliminary part of this study. These factors provided the basis for the

provision of factors that relate to the Kuala Lumpur city centre office market. Rental rate remains the most important factor. Interestingly, the building and location sub criteria emerged among the top ten important factors according to the Importance Index calculation. The findings for the location sub criteria are similar to the previous studies of Dent and White (1998), Higgins (2000), Sing *et.al.* (2006), Coffey and Sherman (2002), Wyatt (1999), Louw (1998), Van Dijk and Pallenberg (2000). The findings for the Financial/Cost sub criteria are similar to the studies by Dow and Porter (2004), Haley & Kampa (1989) and Gibson (2000). The findings for the Building sub criteria are similar to the ones identified by Ho *et.al.* (2005), though the building management and services are given higher priorities. The findings for Lease sub criteria are the provisions under the standard lease terms provisions in Malaysia confirm the concerns of security of tenure and payment of monies terms.

The second identification of the factors influencing tenant office occupation decision making was from the tenants' survey in the first phase of the main study. The factors selected from the various tenant sectors reaffirmed the important criteria and sub criteria from the tenants' perspectives. The sixty (60) factors earlier identified in the expert survey were then reduced to twenty six (26) sub criteria under the four (4) main criteria. Under the Location criteria, there are five (s) sub criteria which mainly highlight the agglomeration factors. As for the Lease criteria, two (2) sub criteria were selected showing concerns about the security of tenure and payment of monies terms. The Building criteria have sixteen (16) sub criteria which were highlighted and selected as important. These sub criteria display the importance of the management and services in relation to tenants' office occupation decision making. The Financial/Cost criteria have three (3) sub criteria mainly showing the emphasis on the monetary concerns for office occupation. They are the rental rate,

occupancy cost and cost of fit out. According to the Important Index score, the most important sub criteria were mainly under Financial/Cost and Building criteria. Thus, some of the sub criteria that have been selected as important in these finding were similar to the ones identified under the experts' survey. The use of PCA and Important Index method unveils the finalisation of the important main and sub criteria for the use of the Analytic Hierarchy Process (AHP). This serves to reduce the number of comparison when too many sub criteria pair-wise selections have to be made. All the relevant criteria: factor loading, Cronbach's Alpha values, use of experts' opinion were used to measure the reliability and validity of the relevant and important criteria in the preliminary and initial stage of the main study.

The combination of the preliminary study and the first phase of the main study uncovered the important criteria and sub criteria for tenants' office decision making. These selections of important criteria however, do not assist with gauging the relative importance between the different sectors of tenants as highlighted in studies by Leishman and Watkins (2002) and Sing *et al*. (2006).

The fourth objective (RO4): *"*To determine the relative importances of the factors in tenant office space occupation decision that portray the preferences of the main sectors at purpose built office buildings in Kuala Lumpur city centre*"* was revealed by the following findings of the main study, achieved with the use of a multi-criteria decision making tool, i.e. Analytical Hierarchy Process (AHP). In uncovering the relative importance of the main and sub criteria from the three (3) sectors that were identified to occupy the majority of the office space of the top grade buildings in Kuala Lumpur city centre, the use of AHP provided the weights to select the different importance.

8.2.2.2 Main Findings of the Second Phase of Main Study

As highlighted from earlier studies showing that different profiles of tenants have different preferences over the factors in the decision making process, it was necessary to reveal the differences. Two aspects of comparison can be gathered from the three (3) sector groups – the different size and categories/sectors of business they are doing. What has been uncovered from the findings shows the various differences. For the comparison between the large and small organisations of all three sectors, the selection on the main criteria has shown different preferences. The large organisations have chosen Financial/Cost while the small organisations have chosen Location. The preference for the sub criteria under each of the four (4) main criteria also portrays the different preference of these two categories of organisational profile. What can be concluded from the comparison of the preference with the previous studies is that the preferences shown by the large and small organisations of the three (3) sectors chosen in the study are different.

Though there is a high correlation between the preference ranks of the large and small organisations for the sub criteria, there is a significance difference in the financial sub criteria, i.e. cost of fit out, on which the large organisations have placed a higher priority. What can be concluded is that the bigger organisations are more concerned about possible high financial costs relating to their office occupation decision than the small organisations from the ranking of the financial sub criteria as the top three ranks.

When the three sectors are compared, each has shown different preference for the important main and sub criteria at varying weights. Apparently, the biggest priority weights given to the financial and location factors. It has been shown that when the comparison of the preference of the sub criteria is made between two sectors at a time, there is a high rank

correlation coefficient between the pair comparison. The ICT & Media sector has shown to be giving less priority to the location sub criteria in the office occupation decision making. On the other hand, the Oil & Gas sector has a higher preference for the building sub criteria than the other two sectors, although the sector has also shown to have a higher preference for the location preference than the ICT & Media sector.

By uncovering the relative weights of the sub criteria and applying the identified measures for each of the respective sub criteria, a TOS assessment matrix is developed. This matrix should be able to indicate the suitable tenants' sector that best fits the available office space in the building.

The fifth and last objective (RO5): *"*To develop a multi-criteria tenant office space preference framework for the main tenant sectors at Kuala Lumpur city centre*"* was achieved by the determination of the relative weights of the sub criteria for the three (3) tenant sectors' preference. The determination of the relative weights (Tables 6.26 and 6.29) along with the office buildings' measurements determined through an earlier study (Daud *et al*., 2011) and experts' opinion (Table 5.5) is then adopted to construct the Tenant Office Space (TOS) assessment matrix. This matrix is an indicator for assessing the suitable tenants for available office space at the office buildings within Kuala Lumpur city centre.

The TOS Assessment Matrix (Figure 6.16) which combined the assessment of the office space sub criteria provision with the determined relative weights was then validated. This was made through the assessment of the preference of invited tenants from the three sectors on the main and sub criteria relative local weights as well as the assessment of preference for office space at nine (9) selected buildings in Kuala Lumpur city centre. Although the

rank correlations do not show the positive correlation for all the preferences between the validated weights and the relative weights from the main findings, there are positive correlations for some of the criteria among the three (3) sectors. As there are instances where the number of criteria is small, this has made the rank comparisons for these criteria less comparable.

When an examination of the differences between the ranks of the main and sub criteria selected by the tenants in the validation exercise and the ones revealed in the study is made, there is a difference of one or two ranks from the selection made by the tenants and the ones generated through the AHP method. Both the ICT & Media and the Oil & Gas sector have displayed almost similar ranks. However, the Finance sector has displayed variation in the ranks of all the four criteria. The difference however is only for less than half of the numbers of tenants in the validation exercise.

When another comparison of the selection of the suitability of office space to be offered at the selected office buildings in the validation exercise is made, the selection is then compared with the ranks that were generated by the TOS framework. This is to gauge the accuracy of the developed TOS assessment framework. It can be observed that there is a similar rating given by all the three sectors for four (4) of the identified buildings. Four (4) other buildings had similar rating for one or two of the criteria, while one (1) building had a similar rating given by all the sectors.

8.3 CONTRIBUTIONS OF THE STUDY

This study has endeavoured to produce both theoretical and practical contributions for office occupation decision making within Kuala Lumpur city centre. These contributions are in the context of the pre-occupancy stage of office occupation decision making for both existing and new available office space. However, theoretical contributions are primarily related to the contribution to knowledge in the decision making phase in relation to the theory of consumer decision making and multi-criteria decision making in relation to consumer preference as mentioned by Simon (1978a) and Helm *et al*. (2008) respectively. Furthermore, the findings of the factors that relate to office occupation in Kuala Lumpur city centre add to the current knowledge on office occupation. The contributions of this study are put forward in Section 8.3.1 (theoretical contributions) and Section 8.3.2 (practical contributions).

8.3.1 Theoretical Contributions

There are two major significant theoretical contributions of this study reflected according to the findings and the adopted research method, i.e. the multi-criteria decision making approach. These findings reveal the criteria and sub criteria for office occupation as well as the different weights preferred by different tenants sectors within the Kuala Lumpur city centre office buildings.

The two major contributions are incorporated in the study. The first encompassed the identification of the conceptual framework through consumer decision making which adopted multi-criteria techniques for office occupation decision making. The second is the identification of the list of office occupation factors for Malaysia which were determined

through literature search, experts' opinion and tenants survey. With the identification of the different preferences for office occupation decision making criteria by different tenants' sectors, the Tenant Office Space (TOS) assessment framework is developed.

In relation to the first major theoretical contribution:

a) Consumer rational decision making and multi-criteria decision making concepts are identified to form the office occupation decision making for office buildings in Kuala Lumpur city centre. There was one main decision making theory, as proposed by Simon (1978a), stipulating the bounded rational decision making which is applied to consumer decision making for the development of the office occupation decision making framework. In assessing office occupation preferences, various factors have been identified under various categories. Since the office occupation decision making deals with multi-criteria choices, the multi-criteria decision making technique is explored to complete the decision making framework. In particular, Analytic Hierarchy Process (AHP) is examined and chosen to complete the office occupation decision making framework.

b) The literature review identified location, financial/cost, building and lease terms under four main categories. One hundred of twenty eight (128) factors are identified. Of these, a total of sixty (60) factors are chosen as relevant to Kuala Lumpur city centre office buildings.

c) The chosen factors were then subjected to tenants' evaluation which through the PCA and Importance Index resulted in a reduction to twenty six (26) factors As

such, the resultant findings show the following important factors under each category:

Location: 'Image/Branding', 'Access to Amenities', 'Level of Crime', 'Access to Public Transportation & Terminal' and 'Access to Market'

Lease: 'Payment of Monies' and 'Termination Clause'

Financial/Cost: 'Rental Rate', 'Total Occupancy Cost' and 'Cost of Fit Out'

Building: 'Fire Prevention & Protection', 'Security & Access Control', 'Safety Policies & Procedures', 'Air Conditioning & Ventilation Systems', 'Responsible Management & Maintenance Team', 'Electric System & Provision', 'Toilet & Sanitary Services', 'Modern IT & Communication Systems', 'Cleaning/Housekeeping', 'Maintenance Policy', 'Car Park Provision & Accessibility', 'Control of Building Services', 'After Hours Operations', 'Building Automation', 'Building Wayfinding' and 'Passenger Lifts Performance' and Control'.

d) From the twenty six (26) sub criteria chosen by the tenants, several observations are made. The agglomeration economies by clustering in the same location as highlighted by earlier studies on face-to-face meetings, accessibility to similar firms, proximity to labour force and sharing of infrastructure (Coffey & Shearmur, 2002; Stanback 1991, Wyatt, 1999, Goddard, 1973) is not all that important to tenants in Kuala Lumpur city centre. Rather, 'branding and image' are considered most important and this is in line the findings of an earlier study which suggested perceptional factors such as attractiveness of surroundings, and visibility or

exposure of office as important (Carn *et al*., 1988). For the Financial/Cost and Lease criteria, the financial and contractual factors of accommodation as mentioned by Louw (1998) were mainly identified. The Building main criteria identified that the sub criteria that relate to building management & services were more important than design and functionality specifications.

In relation to the second major theoretical contributions:

a) The preferences of the different tenants group do differ, as mentioned by Leishman *et al*., 2003. The differences are shown by the weights of the factor which are preferred by the three (3) sectors as well as the size of tenants organisations chosen in the study. While overall the three tenants sectors and the small tenants organisations have chosen location as the most important criteria, there is a tendency for the preferences of the three sectors and small organisations to be similar for the local weights of the factors (sub criteria). The similar preference is also reflected in the global weights placed on the top two (2) factors (sub criteria) and the lowest five (5) factors (sub criteria).

b) The high correlation coefficients of the ranks of the factors (sub criteria) among the three tenants' sectors portray the relationship among the pairs comparisons of the factors (sub criteria). While the factors (sub criteria) under Financial/Cost and Location are among the top ten preferred by the tenants, all three sectors have placed the Building factors (sub criteria) among the lowest preferred. However, it is observed that the ICT & Media and Oil & Gas sectors have placed a few of the Building factors (sub criteria) among the top ten ranked. Thus, the factors (sub

criteria) under Building factors have been considered as important by the two sectors of tenants.

c) The identification of the different weights for each of the sub criteria through the global weights determination by AHP has displayed the various preferences among the tenants' sectors. With this identification, the weights are used in the development of the Tenant Office Space (TOS) assessment framework.

d) Through the TOS assessment framework, the assessments of the suitable tenant sector among the three (3) sectors chosen in the study are able to be identified. The assessment framework provides an indicator of the relative weights to be compared with the office space provisions.

8.3.2 Practical Contributions

It is anticipated that this research would provide five (5) contributions to applied research. Such contributions underpin the issues pertaining to office occupation which relates to the excess of office space in the planning and development stage for the next five years in Kuala Lumpur city centre. Thus, in terms of the practical contributions to the commercial property market and in particular the office market:

1. This study provide an insight to the stakeholders of office space (office buildings owners, investors, developers, managers and estate agents) of the important criteria and sub criteria preferred by tenants in order to achieve maximisation of office occupancy and reduce vacancies.

2. The TOS assessment framework allows stakeholders to make an assessment of the possible suitable tenants to fit the available office space. Should a certain category of tenants be required, the improvements necessary to attract them can be targeted wherever possible. As in the case of location sub criteria, these sub criteria may not be possibly improved due to the limitation of the situs element.

3. The TOS assessment framework will also allow the stakeholder, especially the owners and developers, to make the necessary relevant provision for future office space developments. These indicators can be utilised as guidelines to make suitable provision to suit the majority of tenants interested to occupy office space in the future office developments in Kuala Lumpur city centre.

4. With the current assessment of the potential tenants planning to occupy the office space in the Kuala Lumpur city centre, the local and planning authorities should be able to gauge the infrastructure needs, especially in terms of accessibility to amenities and public transportation terminals. The authorities must take into account the needs of the tenants in the provision of the office locational environment, which includes the crime rate.

5. Potential office developers/investors should be aware of the office market conditions that influence office demand. Thus, knowing the potential office occupiers' - especially potential tenants' - needs and preferences in their office occupation decision making, would assist in reducing the level of office vacancies. Identification of potential tenants is only possible through assessment of the current examination of the standard classification of services which are currently relevant in

the Kuala Lumpur business market. Successful assessment of the potential needs for future office space is only possible by the right identification of the potential tenants who would occupy the office space in Kuala Lumpur city centre.

8.4 LIMITATIONS OF THE STUDY

Although a rigorous literature review was conducted to obtain the list of criteria and sub criteria that influence office occupation (refer to Tables 3.2, 3.3, 3.4 and 3.5), it is inevitable that some criteria of recent studies were inadvertently missed out and hence excluded in this study. This is the first limitation of the study.

Most of the literature on office occupation does not cover the factors of office occupation for tenants. In fact, the current study covers the factors that affect tenants and not the owner-occupiers. Thus, the findings of the study limit the discussion on the preference of tenants from the perspective of consumers of space, and do not reveal any relation to the corporate behaviours from the corporate real estate perspective.

This study is conducted on the premise that the tenants are examining the criteria should they want to occupy the office space, and does not made any distinction on the factors that are considered for initial occupation or relocation.

The scope of the study covers the tenants of top grade office buildings in Kuala Lumpur city centre and as such would not be able to explain the preferences of those tenants not within the study area.

The sampling frame for the determination of the relative weights of the criteria and sub criteria comprised three (3) main sectors of the current tenants occupying the office space in Kuala Lumpur city centre: Finance/Banking, ICT & Media and Oil & Gas sectors. The findings of the relative weights do not reflect the preference of the other tenants' sectors.

8.5 RECOMMENDATIONS FOR FUTURE RESEARCH

This study is envisaged to provide a roadmap to five (5) potential future areas of research. The recommendations are:

1. The further examination of main and sub criteria influencing tenants' office occupation decision making in different business and market conditions. The analysis adopted in this study is able to provide insights into the office occupation behaviour related to the current business and market conditions. It is unlikely that the analysis will be consistent over time when business conditions may affect tenants' office occupation decision making.

2. The further examination of the relative weights of the main and sub criteria with different types of tenants' sectors. As the three (3) profiles of tenants have been shown to have different preferences in this study, it is presumed that further examination of the different relative weights of the main and sub criteria from more tenants sectors would reveal a different set of preferences. This examination would add up to the past office occupation literature. Thus, this will also lead to the re-examination of the TOS assessment framework with more sets of tenant sectors' weights. Assessment of suitable tenants can be performed to observe the extent of

accuracy and the differences of the outcome.

3. The examination of the important main and sub criteria and their relative weights for different tenants sectors for office buildings not within Kuala Lumpur city centre. The outcome of this further examination could be compared with this study to analyse the differences and make necessary improvements to the office market sector. It will be self-fulfilling, amidst the contribution of knowledge, to look at the proposed TOS assessment framework of these different areas.

4. The examination of the outcome of the preference with a different consumer preference method used, which includes Conjoint Analysis. The outcome can be compared with the findings in this study to gauge the differences between the preferences and understand the factors that may influence the decision making process.

5. The examination of different multi-criteria decision making (MCDM) techniques such as Analytic Network Process (ANP) or fuzzy AHP. Comparison of the outcome can be made to understand the complex nature of multi-criteria decision making and add up to the current knowledge of MCDM in consumer decision making perspectives.

Finally a joint research between the institution of higher learning, National Property Information Centre under the Department of Valuation & Property Services, Ministry of Finance, Housing and the Department of Statistics could be one of the options to reach out to the industry through the findings of the study. Support from industry players like

the corporate and institutional property developers such as Permodalan Nasional Berhad (PNB), Sime Darby Property, KLCC Holdings, Malaysia Property Incorporated and the involvement of professional organisations such as the Royal Institution of Surveyors, Malaysia (RISM), the Association of Private Valuers and Consultants (PEPS), the Malaysian Institute of Estate Agents (MIEA) and Royal Institution of Chartered Surveyors (RICS) would give practical value to the research. This, in turn would not only further improve and enhance office occupancy in future office development in this country but would also contribute to the general body of knowledge.

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APPENDIX A

List of Purpose Built Office Buildings in the Study

Building Identification	Location	Total Built Up Area (sf)	Net Lettable Area (sf)
Building 1	Jalan Raja Laut	196,862	151,432
Building 2	Jalan Sultan Ismail	275,704	212,080
Building 3	Jalan Sultan Ismail	580,000	478,764
Building 4	Jalan Sultan Ismail	438,664	337,434
Building 5	Jalan Tunku Abdul Rahman	1,025,136	230,820
Building 6	Jalan Munshi Abdullah	703,115	495,407
Building 7	Jalan Raja Laut	657,888	334,160
Building 8	Jalan Sultan Hishamuddin	1,500,000	538,832
Building 9	Jalan Melaka	223,916	131,793
Building 10	Jalan Ampang	380,000	273,000
Building 11	Lebuh Ampang	205,605	143,900
Building 12	Jalan Hang Kasturi	111,817	86,013
Building 13	Changkat Raja Chulan	123,537	92,653
Building 14	Changkat Raja Chulan	130,850	98,138
Building 15	Jalan Raja Chulan	132,396	105,917
Building 16	Jalan Kia Peng	409,102	388,796
Building 17	Jalan P Ramlee	418,502	374,025
Building 18	Jalan P Ramlee	329,569	263,655
Building 19	Jalan Sultan Ismail	329,95	330,000
Building 20	Jalan Perak	661,259	495,944
Building 21	Lorong P Ramlee	79,628	59,721
Building 22	Changkat Raja Chulan	402,071	321,657
Building 23	Jalan Sultan Ismail	55,470	44,376
Building 24	Jalan Raja Chulan	324,880	270,000
Building 25	Jalan Raja Chulan	337,346	269,877
Building 26	Persiaran Raja Chulan	716,034	572,828
Building 27	Jalan Sultan Ismail	471,755	353,816
Building 28	Jalan Sultan Ismail	444,144	333,108
Building 29	Jalan Sultan Ismail	176,176	132,132
Building 30	Jalan Sultan Ismail	399,995	299,996
Building 31	Jalan Sultan Ismail	432,500	346,000
Building 32	Jalan Sultan Ismail	230,071	184,057
Building 33	Jalan Sultan Ismail	509,729	407,783
Building 34	Lorong P Ramlee	242,067	188,766
Building 35	Jalan Ampang	246,298	162,200
Building 36	Jalan Ampang	2,654,352	1,990,764
Building 37	Jalan Ampang	917,033	733,626
Building 38	Jalan Ampang	775,419	533,506
Building 39	Jalan Ampang	343,782	245,667
Building 40	Jalan Ampang	250,000	182,525

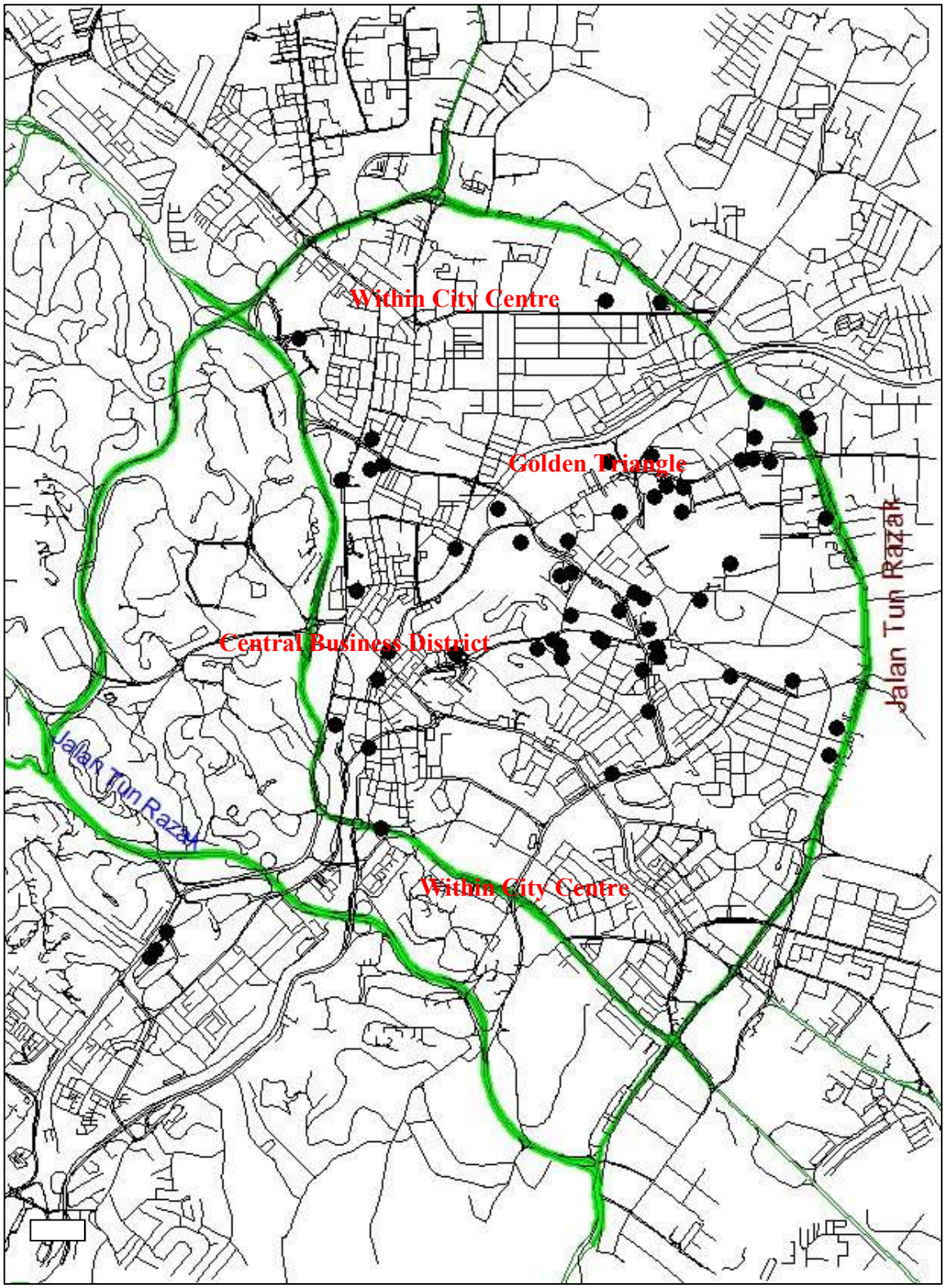
APPENDIX A

Building Identification	Location	Total Built Up Area (sf)	Net Lettable Area (sf)
Building 41	Jalan Ampang	318,797	221,950
Building 42	Jalan Ampang	347,790	345,558
Building 43	Jalan Kia Peng	531,303	380,797
Building 44	Jalan Tun Razak	281,250	225,000
Building 45	Jalan Tun Razak	618,750	576,000
Building 46	Jalan Tun Razak	296,493	230,000
Building 47	Jalan Tun Razak	175,000	140,000
Building 48	Jalan Tun Razak	406,738	325,390
Building 49	Jalan Tun Razak	85,776	68,621
Building 50	Jalan Raja Chuan	197,830	158,264
Building 51	Jalan Raja Chulan	403,750	323,000
Building 52	Jalan Sultan Ismail	11,399	9,119
Building 53	Jalan Sultan Ismail	433,518	264,000
Building 54	Jalan Raja Abdullah	175,305	140,244
Building 55	Jalan Tun Razak	409,992	288,495
Building 56	Jalan Sultan Sulaiman	215,396	161,547
Building 57	Jalan Putra	400,000	303,000
Building 58	Jalan Travers	787,735	590,801
Building 59	Jalan Travers	849,790	637,343
Building 60	Lingkaran Syed Putra	262,500	210,000
Building 61	Jalan Travers	453,000	339,750

(Source: Master Plan Department, Kuala Lumpur City Hall, 2009)

APPENDIX A

Map of Kuala Lumput city centre and the distribution of the selected Purpose Built Office Buildings in the study



Source: Adapted from Kuala Lumpur Stucture Plan 2020, City Hall Kuala Lumpur

Appendix B

Summary of the Invited Experts in the Delphi Study

Criteria	Experts Groups	Organisations	No of Experts Identified
• Must have experience in office space leasing • Must have high level of expertise in office space leasing • Must hold a position of at least senior officer or senior executive	Property Managers	1. Selangor Dregding Berhad 2. Capital Square Management Sdn Berhad 3. UBN Property Management Unit 4. IGB Properties SB 5. Kuala Lumpur City Centre (KLCC) Property Unit 6. Employers Providents Fund Property Unit 7. National Pilgrims Fund Property Unit 8. Angkasa Raya Development 9. Oakwood Sdn Bhd (Menara Genting) 10. Naluri Properties Sdn Bhd 11. Menara PanGlobal Sdn Bhd 12. Great Eastern Life Property Unit 13. Yayasan Tun Razak 14. Keck Seng (Malaysia) Berhad Property Unit 15. Boustead Tower Management 16. KL Sentral Sdn Bhd 17. Dion Realities Sdn Bhd 18. Amsterling Sdn Bhd 19. Goldhill Building Management 20. UOA Holdings Sdn Bhd	20
	Property Consultants/Leasing Consultants	1. PPC International Sdn Bhd 2. Henry Butcher Marketing Sdn Bhd 3. CH Williams Talhar & Wong 4. CB Richard Ellis 5. Jones Lang Wotton 6. Rahim & Co Savills 7. JS Valuers Sdn Bhd 8. DTZ Nawawi Tie Leung Sdn Bhd 9. IM Global Property Consultants 10. Yap Burgess Rawson 11. Knight Frank Ooi & Zaharin Sdn Bhd 12. HH Low & Associates 13. Raine & Horne Zaki & Partners 14. Nilai Harta Sdn Bhd 15. VPC Alliance Sdn Bhd 16. KGV Lambert Smith 17. Zerin Properties 18. YY Property Solutions 19. Khong & Jaafar 20. Colliers, Jordan Lee & Jaafar	20

Appendix C

January 2010

The Managing Director
Shin Nippon Machinery (M) Sdn Bhd
Level 15-2, Menara TH Perdana
1001, Jalan Sultan Ismail
50250 Kuala Lumpur

Dear Sir/Madam,

TITLE OF RESEARCH: IDENTIFICATION OF FACTORS INFLUENCING OFFICE BUILDING OCCUPATION BY TENANTS IN KUALA LUMPUR - A STUDY OF TENANTS' PREFERENCE

I am carrying out a research project with the above title in which the study intends to explore how different sets of tenants make an assessment of the factors in the occupation of office buildings particularly in the central business district (CBD) area of Kuala Lumpur.

As one of the organizations that are occupying a space in an office building in Kuala Lumpur, I would appreciate if you could participate in this research. Attached please find copies of the covering information and survey forms for your information and further action. ***Kindly complete and return the attached survey forms within two (2) weeks*** to me by email or fax at the given numbers below or you may submit the form through our appointed Research Assistant if you need us to come and collect them from your office.

Thank you for your interest and participation in this study, I genuinely appreciate your time. Should you wish to have a copy of the findings of the research, kindly leave your particulars on the survey forms.

Wishing you a Happy New Year.

Yours faithfully,

Yasmin Mohd Adnan
Lecturer/PhD Candidate/Project Leader
Department of Estate Management/Centre for Studies in Urban & Regional Real Estate
Faculty of the Built Environment
University of Malaya,Kuala Lumpur
Email address: yasmin_alambina@um.edu.my
Tel No: 03-79676845/79677620/ Fax No: 03-79675713/7620

Appendix C

Dear Sir/Madam,

I am carrying out a survey to seek the factors that are important to tenants in deciding where to locate which can be very valuable to the providers of the office space which may include property owners, investors, marketing agents as well as policy makers.

As a tenant occupying an office space, you (as the representative in the decision making for your organization) undoubtedly have made an assessment of the factors considered important in the occupation decision making process. Thus, your response in this survey can greatly contribute to some of the main objectives of the study; which are as follows:

a) To identify the factors considered important by tenants in the office occupation decision making process.
b) To identify the different preference among the various tenant sectors.

I am conducting this research as part of my PhD research project on office building occupation decision making by tenants in the Central Business District, Kuala Lumpur. Thus, I want to study how different sets of tenants in different profiles of the physical environment make an assessment of the factors in the occupation of office buildings particularly in the central business district area of Kuala Lumpur. This area which forms the initial business and trading area of Kuala Lumpur has undergone a transformation in the effort to make Kuala Lumpur a global city. For your information, this study is also funded by the UM Research University Research Fund and the Fundamental Research Grant Scheme (FRGS) by the Ministry of Higher Education, Malaysia.

This survey, which forms part of the Main Survey, has selected the factors identified from various literature and previous researches conducted both locally and internationally. Through your feedback, the information shall be used to seek the relationship of *your selected important factors* with the profiles of the tenants and the physical environment of each office space.

Your participation in this research is, of course voluntary. Your confidentiality and anonymity are assured. Return of the survey to me is your consent for your responses to be compiled with others. Although the survey is coded to allow for follow-up with non-respondents, you will not be individually identified with your questionnaire or responses. Please understand that the use of this data will be limited to this research, as authorized by the University of Malaya. You also have the right to express concerns to me at the contact address or number below, or to my Supervisor, address shown below. By participating, you will be given a summary of the findings. Please provide your contact address at the end of the questionnaire form.

I greatly appreciate your participation in this research. ***Please return the questionnaire within two (2) weeks*** to me through the self addressed envelope or email or fax at the given nos below.

Thank you for your interest and participation in this study, I genuinely appreciate your time.

Yours faithfully,

Yasmin Mohd Adnan
Lecturer/PhD Candidate/Project Leader
Department of Estate Management/
Centre for Studies in Urban & Regional Real Estate
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Email address: yasmin_alambina@um.edu.my (Tel No: 03-79676845)7

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University of Malaya,50603,Kuala Lumpur
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Tel No: 03-79676880

Appendix C

Appendix C

Appendix C

Appendix D

November 2009

Building Manager

Dear Sir/Madam,

IDENTIFICATION OF FACTORS INFLUENCING OFFICE BUILDING OCCUPATION BY TENANTS IN KUALA LUMPUR - A STUDY OF TENANTS' PREFERENCE

I am carrying out a research project with the above title which intends to study how different sets of tenants make an assessment of the factors in the occupation of office buildings particularly in the central business district (CBD) area of Kuala Lumpur. This area which forms the initial business and trading area of Kuala Lumpur has undergone a transformation in the effort to make Kuala Lumpur a global city. An earlier study made by Bavenstock et al (1999) has classified cities based on four (4) main types of services comprising accounting, advertising, banking and legal.

However, to date, there is no document that has captured the composition of tenants in the various office buildings in Kuala Lumpur. Therefore as a preliminary step of the research process, it is my intention to gather such information before I could gather the main factors in the decision making process of occupation from the tenants.

I greatly appreciate your participation in this research. ***Please return the attached survey form within one (1) week*** to me through the self addressed envelope or email or fax at the given contact numbers below or you may submit the form through our appointed Research Assistant undertaking the survey exercise.

Thank you for your interest and participation in this study, I genuinely appreciate your time. Should you wish to have a copy of the findings of the research, kindly leave your particulars on the survey form.

Thank You.

Yours faithfully,

Yasmin Mohd Adnan
Lecturer/PhD Candidate/Project Leader
Department of Estate Management/Centre for Studies in Urban & Regional Real Estate
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Email address: yasmin_alambina@um.edu.my
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Centre for Studies in Urban & Regional Real Estate (SURE)
Faculty of the Built Environment
University of Malaya
50603 Kuala Lumpur

Appendix D

Appendix E

3rd August 2010

Oracle Corporation (Malaysia) Sdn Bhd
Menara Citibank
165, Jalan Ampang
50450 Kuala Lumpur

Dear Sir,

Re: Identification of the Important Main Factors/Criteria and Sub-Factors/Sub-Criteria for Office Occupation Decision Making by Tenants at Office Buildings in the city centre of Kuala Lumpur

We are undertaking a study to identify the important factors for office space decision at the office buildings in the city centre of Kuala Lumpur. From the responses of an earlier survey which were gathered earlier, we have selected the main important factors identified by various categories of services and trade. For your information, this survey is also part of a PhD study with funding from the University of Malaya.

We would like to invite your good self as representative of your organization to be a respondent to this survey. It entails making a relative assessment of the importance of the factors and sub factors for office occupation decision. The purpose of this survey is to identify the relative importance of both the main factor/criteria and sub-factor/sub-criteria towards the development of a framework specifying the important factors for each type of services and trade. The results of the research are expected to contribute towards identifying the important factors for office occupation, and consequently to provide guidelines for office space provision. The information would be useful for office providers which include property developers, property owners, property managers and investors.

Your participation in this survey is much needed and, it is on a voluntary basis. You are kindly requested to complete the attached questionnaire and return it via prepaid self-addressed envelope on or before 18th August 2010. The questionnaire consists of nine pages and will take approximately 20-25 minutes to complete. I would like to assure you that **your responses will be treated with strict confidence and strictly used for academic purposes only.**

If you have any queries regarding this survey, please do not hesitate to contact me.

I hope you will find the questionnaire interesting and thought-provoking. Thank you for your time and participation.

Yours faithfully,

Yasmin Mohd Adnan
Project Leader/PhD Candidate
Department of Estate Management/
Centre for Studies in Urban and Regional Real Estate (SURE) Faculty of the Built Environment
University of Malaya
50603 Kuala Lumpur.
Tel / E-mail: 03-79677620 / yasmin_alambina@um.edu.my

(This is a computer generated letter and no signature is required)

Appendix E

Appendix F

Summary of the Mean, Median, Mode and Standard Deviation of the factors identified from the literature as selected by Experts after Round II.

Evaluation Factors	Mean	Mode	Standard Deviation
A Location			
1. Branding/Image	4.3	4.0	0.6
2. Access to Market	3.7	4.0	1.1
3. Access to Amenities	4.3	4.0	0.6
4. Access to Skilled Labour	3.6	4.0	0.9
5. Access to Cheap & Non Skilled Labour	2.4	3.0	1.0
6. Convenience to Residential Area	2.7	3.0	1.0
7. Commuting Cost	3.3	3.0	0.8
8. Proximity to firms of similar business	3.0	4.0	1.0
9. Proximity to complementary business (agglomeration)	3.4	3.0	0.9
10. Proximity to Support Services/Suppliers	3.7	3.0	1.1
11. Proximity to Clients/market	3.8	4.0	1.1
12. Proximity to Factors of Production	3.0	3.0	1.0
13. Factors of Production Cost	2.4	3.0	0.9
14. Access to Raw Materials	2.3	1.0	1.0
15. Proximity to Investors	2.8	3.0	1.3
16. Proximity to Corporate HQ	3.0	3.0	1.3
17. Proximity to Financiers	2.8	3.0	1.2
18. Proximity to Specialist Services	2.8	3.0	1.0
19. Proximity to Authorities related to business	2.8	3.0	1.1
20. High Level of Transportation Infrastructure	3.7	4.0	0.9
21. Accessibility to Public Transportation & Terminal	4.1	4.0	0.7
22. Proximity to Transport Terminal	3.7	4.0	0.8
23. Accessibility by Private Vehicles	4.0	4.0	0.9
24. Proximity to Major Trunk Roads	3.6	4.0	1.1
25. Proximity to Other Sub urban centres	3.0	3.0	0.8
26. Market Size	3.4	3.0	1.0
27. Visibility to clients	3.9	4.0	0.7
28. Proximity to Competitors	2.5	1.0	0.6
29. Level of Criminal Rate	4.0	4.0	1.1
30. Level of Pollution	3.4	3.0	1.1
31. Traffic Conditions	4.0	4.0	0.7
B. Lease Features			
1. Use of Premise	4.0	5.0	1.2
2. Indemnity	3.4	4.0	1.0
3. Compliance to In House Regulations	3.7	4.0	1.0
4. Fitting Out Clause	3.6	4.0	0.7
5. Alterations and Renovation Clause	3.8	4.0	0.8
6. Payment of Rental	4.0	4.0	0.9
7. Payment of Deposits	3.9	5.0	0.9
8. Payments of Outgoings	4.0	4.0	0.8
9. Termination Clause	4.1	4.0	0.8
10. Review Period/Duration of Renewal	4.2	5.0	0.7

Evaluation Factors	Mean	Mode	Standard Deviation
11. Renewal Terms	4.4	5.0	0.6
12. Rent Review Pattern	4.3	4.0	0.6
13. Repairs & Insurance	3.4	3.0	0.6
14. Ability to Assign	3.4	3.0	1.0
15. Break Clause	3.3	3.0	1.0
16. Lease length	4.4	4.0	0.6
17. Incentives	4.0	4.0	0.7
C. Building Features, Services & Management			
1. Age of Building	3.6	3.0	0.6
2. No of Storey	2.6	3.0	1.0
3. Finishes Specification	4.0	4.0	0.7
4. Design of Entrance & Foyer	4.0	4.0	0.7
5. Modern Prestigious Building	4.1	4.0	0.6
6. Entrance/Foyer Accessibility	4.2	4.0	0.5
7. Quality of Reception	3.9	4.0	0.6
8. Quality of Presentation of External Finishes	3.9	4.0	0.8
9. Common Area Space & Finishes	3.9	4.0	0.7
10. Building Visibility	4.1	4.0	0.7
11. Building Identity & Image	4.5	4.0	0.6
12. External Façade	3.9	4.0	0.8
13. Internal Space Finishes	3.7	4.0	0.9
14. Quality Architectural design and Building Finishes	3.9	4.0	0.6
15. Security & Access Control	4.6	5.0	0.5
16. Responsible Management & Maintenance Team e.g Responsive	4.6	5.0	0.5
17. Maintenance Policy	4.3	4.0	0.6
18. Cleaning/Housekeeping Services	4.0	5.0	0.8
19. Energy Conservation & Recycling Policies	3.1	3.0	1.1
20. Building Automation & Energy Management Systems	3.5	3.0	0.8
21. Safety Policies & Procedure	4.0	5.0	1.1
22. Fire Prevention & Protection	4.0	5.0	1.0
23. Responsive to Service Requests	3.8	5.0	1.1
24. After Hours Operations	4.3	5.0	0.6
25. Floor Plate Size	4.1	4.0	0.6
26. Floor Ceiling Height	4.2	4.0	0.6
27. Building Size	3.9	4.0	0.5
28. Flexible Space Layout & large floor plate	3.4	3.0	0.7
29. Orientation of Space	4.3	5.0	0.7
30. Good Geomancy	3.8	3.0	0.8
31. Availability of space for future expansion	3.1	3.0	0.8
32. Comfortable and Secure working environment	3.9	4.0	0.7
33. Space Efficiency	4.3	4.0	0.6
34. Column layout an Sub divisibility	4.1	4.0	0.5
35. Floor Loading	4.1	4.0	0.6
36. Underfloor Trunking	3.2	3.0	1.0
37. Riser Space for ICT & Security Systems	3.8	3.0	0.8

Evaluation Factors	Mean	Mode	Standard Deviation
38. Adequacy of natural lighting	4.1	5.0	0.8
39. Energy Efficient/Green Building	3.8	4.0	0.8
40. Design & Space Planning	3.4	3.0	0.6
41. View	4.0	4.0	0.6
42. Raised Floor	4.0	4.0	0.8
43. Toilet & Sanitary Facilities	3.0	3.0	0.9
44. Air Conditioning System	4.0	4.0	0.7
45. Electrical Systems	4.3	5.0	0.6
46. Modern IT & Telecommunication Systems	4.1	5.0	0.8
47. Fire Fighting Systems	4.4	4.0	0.7
48. Adequacy of Ventilation	4.0	4.0	1.1
49. Standby Power Supply	3.8	4.0	0.7
50. Broadband copper & fibre optic connection	4.0	4.0	0.8
51. Wireless communication within tenanted area	4.0	5.0	1.2
52. Energy Generating capacity	3.4	3.0	1.3
53. Control of Building Services eg M & E	3.2	3.0	1.0
54. Control of Noise	3.5	4.0	0.9
55. Ease of Use of Entrance & Capacity	3.7	4.0	0.9
56. Location of Lifts, Stairs, Corridor	3.7	4.0	1.1
57. Capacity of Lifts	3.7	4.0	0.8
58. Speed of Lifts	3.9	4.0	0.8
59. Passenger Lifts Performance & Control	4.0	4.0	0.9
60. Good Lifts & Loading Bay Design	3.2	3.0	1.0
61. Capacity of Stairs	2.9	3.0	1.1
62. Adequacy of Good Access & Circulation feature	3.5	4.0	1.1
63. Capacity of Corridors for movement	3.4	3.0	0.9
64. Car Park Provision & Accessibility	4.5	5.0	0.6
65. Building Wayfinding	4.0	4.0	0.8
66. Ease of Disabled Circulation	3.3	3.0	1.0
67. Existence of Loading Bay	3.2	3.0	1.3
68. Food & Beverage outlets	3.9	4.0	0.7
69. Sport and Recreation facilities	2.9	3.0	0.8
70. Landscaping	3.2	3.0	0.8
71. Bank, Postal & Retail Services	3.5	3.0	0.8
72. Provision of Vending & catering Services	2.8	3.0	1.1
73. Conference Facilities	2.9	2.0	0.8
D. Monetary Consideration			
1.Rental Rate	4.8	5.0	0.5
2.Cost of Fit Out	4.3	5.0	0.8
3.Running Cost	4.3	4.0	0.6
4.Total Occupancy Cost	4.4	5.0	0.7
5.Cost of Exiting	4.0	4.0	0.8
6.Cost of Office Fiishing	3.6	3.0	0.8
7.Cost of Office Administration	3.4	3.0	0.9

T TEST results for the 2 categories comparison

Big and Small Organisations

FACTOR/SUB CRITERIA: Branding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.03628333	.034110245
Small	16	.05531250	.078532132

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.783	26	.441	NS	-0.33787

FACTOR/SUB CRITERIA: Access to Market

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02783333	.022429013
Small	16	.06931250	.068159341

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-2.019	26	0.05	S	-0.91577

FACTOR/SUB CRITERIA: Access to Amenities

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.05800000	.049400037
Small	16	.04950000	.042457822

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.489	26	0.629	NS	0.185069

FACTOR/SUB CRITERIA: Access to Public Transportation & Terminal

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.05916667	.038183369
Small	16	.06006250	.051630054

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	0.96	26	0.96	NS	-0.01995

FACTOR/SUB CRITERIA: Level of Criminal Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.06291667	.067309946
Small	16	.06373750	.037567129

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-0.41	26	0.968	NS	-0.01565

FACTOR/SUB CRITERIA: Termination Clause

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation

Big	12	.04941667	.036447866
Small	16	.04756250	.030447701

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.147	26	.0.885	NS	0.055435

FACTOR/SUB CRITERIA: Payment of Monies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.04225000	.036464491
Small	16	.05393750	.040737319

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-0.785	26	0.440	NS	-0.30278

FACTOR/SUB CRITERIA: Security & Access Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02066667	.013852032
Small	16	.02437500	.017884351

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-0.596	26	0.557	NS	-0.2337

FACTOR/SUB CRITERIA: Responsible Management & Maintenance

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02058333	.015042113
Small	16	.03562500	.024619437

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.866	26	0.073	NS	-0.7585

FACTOR/SUB CRITERIA: Maintenance Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.01750000	.016082175
Small	16	.02756250	.026358980

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.166	26	0.254	NS	-0.47419

FACTOR/SUB CRITERIA: Cleaning/Housekeeping

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.01641667	.014755328
Small	16	.01631250	.008162669

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.24	26	0.981	NS	0.009091

FACTOR/SUB CRITERIA: Safety Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02000000	.014167825
Small	16	.02843750	.022724345

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.129	26	.0.269	NS	-0.45741

FACTOR/SUB CRITERIA: Fire Prevention & Protection

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02666667	.017808748
Small	16	.03243750	.022893867

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-0.723	26	0.476	NS	-0.28356

FACTOR/SUB CRITERIA: After Hours Operations

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.01633333	.013917506
Small	16	.02000000	.011741664

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-0.756	26	0.457	NS	-0.2858

FACTOR/SUB CRITERIA: Toilet & Sanitary Fittings

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.01841667	.013187172
Small	16	.03100000	.034395736

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.198	26	0.242	NS	-0.5289

FACTOR/SUB CRITERIA: Air Conditioning & Ventilation

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02750000	.015535882
Small	16	.02161250	.012372112

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.117	26	0.274	NS	0.421922

FACTOR/SUB CRITERIA: Electrical System Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02783333	.015798926
Small	16	.02475000	.017890407

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.474	26	0.640	NS	0.183045

FACTOR/SUB CRITERIA: Modern IT & Telecommunication Systems

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.03341667	.020137971
Small	16	.03243750	.040682459

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.76	26	0.94	NS	0.032199

FACTOR/SUB CRITERIA: Building Automation & EMS

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02366667	.017447758
Small	16	.01993750	.013051022

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.648	26	0.523	NS	0.244546

FACTOR/SUB CRITERIA: Control of Bldg Services

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02250000	.015388898
Small	16	.01900000	.012066483

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.675	26	.505	NS	0.25495

FACTOR/SUB CRITERIA: Passenger Lift Capacity & Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02658333	.017207072
Small	16	.02468750	.016664208

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.294	26	0.771	NS	0.111943

FACTOR/SUB CRITERIA: Car Park Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02916667	.013657055
Small	16	.02156250	.016070548

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.319	26	0.199	NS	0.51159

FACTOR/SUB CRITERIA: Building Way Finding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.02516667	.020475410

Small	16	.01506250	.008543760

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.786	26	0.86	NS	0.696379

FACTOR/SUB CRITERIA: Rental Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.09508333	.069849785
Small	16	.08743750	.053537487

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.328	26	0.745	NS	0.123932

FACTOR/SUB CRITERIA: Cost of Fit Out

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.08283333	.078788362
Small	16	.02893750	.025545955

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	2.576	26	0.016	S	1.033137

FACTOR/SUB CRITERIA: Total Occupancy Cost

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Big	12	.09875000	.080453403
Small	16	.08250000	.082857307

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	0.520	26	0.608	NS	0.199007

T TEST results for the 2 sectors comparison

Finance/Banking and ICT & Media

FACTOR/SUB CRITERIA: Branding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.04964000	.046055599
ICT & Media	9	.06522222	.032194193

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.457	17	.654	NS	0.2184

FACTOR/SUB CRITERIA: Access to Market

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.07840000	.075299698

ICT & Media	9	.03600000	.030066593

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.576	17	.133	NS	0.8048

FACTOR/SUB CRITERIA: Access to Amenities

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05650000	.038953676
ICT & Media	9	.03866667	.025401772

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.167	17	.259	NS	0.5542

FACTOR/SUB CRITERIA: Access to Public Transportation & Terminal

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.06260000	.043952500
ICT & Media	9	.03355556	.020439613

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.810	17	.088	NS	0.9021

FACTOR/SUB CRITERIA: Level of Criminal Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05980000	.053461928
ICT & Media	9	.05797778	.068130422

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.065	17	.949	NS	0.0299

FACTOR/SUB CRITERIA: Termination Clause

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05510000	.035995216
ICT & Media	9	.04833333	.036721928

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.405	17	.690	NS	0.1861

FACTOR/SUB CRITERIA: Payment of Monies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03180000	.033825697
ICT & Media	9	.06444444	.040487995

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.915	17	.073	NS	0.8785

FACTOR/SUB CRITERIA: Security & Access Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02280000	.020900824
ICT & Media	9	.02422222	.013507200

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.174	17	.864	NS	0.0826

FACTOR/SUB CRITERIA: Responsible Management & Maintenance

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03110000	.031114305
ICT & Media	9	.03011111	.019035785

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.082	17	.935	NS	0.0394

FACTOR/SUB CRITERIA: Maintenance Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03240000	.034747342
ICT & Media	9	.01644444	.006002314

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	1.356	17	.193	NS	0.7831

FACTOR/SUB CRITERIA: Cleaning/Housekeeping

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01810000	.011694728
ICT & Media	9	.01477778	.007479602

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.728	17	.477	NS	0.3465

FACTOR/SUB CRITERIA: Safety Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02770000	.029694930
ICT & Media	9	.01922222	.012407435

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.795	17	.438	NS	0.4027

FACTOR/SUB CRITERIA: Fire Prevention & Protection

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02620000	.021059703
ICT & Media	9	.03288889	.025250963

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.629	17	.537	NS	0.2888

FACTOR/SUB CRITERIA: After Hours Operations

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01540000	.012139925
ICT & Media	9	.01744444	.011270660

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.379	17	.709	NS	0.1746

FACTOR/SUB CRITERIA: Toilet & Sanitary Fittings

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02040000	.012312595
ICT & Media	9	.03844444	.045505799

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.209	17	.243	NS	0.6241

FACTOR/SUB CRITERIA: Air Conditioning & Ventilation

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02210000	.012547244
ICT & Media	9	.02277778	.014906188

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.108	17	.916	NS	0.0493

FACTOR/SUB CRITERIA: Electrical System Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02280000	.013389880
ICT & Media	9	.02777778	.022857044

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.587	17	.565	NS	0.2746

FACTOR/SUB CRITERIA: Modern IT & Telecommunication Systems

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02170000	.013208162
ICT & Media	9	.04833333	.051512134

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.583	17	.132	NS	0.8230

FACTOR/SUB CRITERIA: Building Automation & EMS

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01580000	.011545081
ICT & Media	9	.02444444	.018194169

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-1.251	17	.228	NS	0.5813

FACTOR/SUB CRITERIA: Control of Bldg Services

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01720000	.010840254
ICT & Media	9	.02066667	.016140012

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.555	17	.586	NS	0.2569

FACTOR/SUB CRITERIA: Passenger Lift Capacity & Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01970000	.010520351
ICT & Media	9	.02166667	.014815532

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.336	17	.741	NS	0.1552

FACTOR/SUB CRITERIA: Car Park Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02060000	.012001852
ICT & Media	9	.02744444	.019513528

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.932	17	.364	NS	0.4343

FACTOR/SUB CRITERIA: Building Way Finding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01490000	.012269655
ICT & Media	9	.02077778	.019324711

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.800	17	.435	NS	0.3720

FACTOR/SUB CRITERIA: Rental Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.09910000	.043585038
ICT & Media	9	.08811111	.067127573

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.428	17	.674	NS	0.1985

FACTOR/SUB CRITERIA: Cost of Fit Out

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05190000	.058285600
ICT & Media	9	.05955556	.077769067

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	-.244	17	.810	NS	0.1125

FACTOR/SUB CRITERIA: Total Occupancy Cost

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.09010000	.077365582
ICT & Media	9	.08688889	.080733271

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances assumed	.089	17	.931	NS	0.0406

T TEST

Finance/Banking and Oil &Gas

FACTOR/SUB CRITERIA: Branding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.04964000	.046055599
Oil & Gas	9	.02633333	.029945784

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.320	15.575	.206	NS	0.6133

FACTOR/SUB CRITERIA: Access to Market

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.07840000	.075299698
Oil & Gas	9	.03722222	.046799513

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.447	15.228	.168	NS	0.6744

FACTOR/SUB CRITERIA: Access to Amenities

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05650000	.038953676
Oil & Gas	9	.06388889	.063760184

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.301	12.976	.768	NS	0.1438

FACTOR/SUB CRITERIA: Access to Public Transportation & Terminal

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.06260000	.043952500
Oil & Gas	9	.08255556	.055184036

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.866	15.307	.400	NS	0.4025

FACTOR/SUB CRITERIA: Level of Criminal Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05980000	.053461928
Oil & Gas	9	.07277778	.029511768

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.663	14.284	.518	NS	0.3128

FACTOR/SUB CRITERIA: Termination Clause

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05510000	.035995216
Oil & Gas	9	.04088889	.025339911

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.003	16.136	.331	NS	0.4633

FACTOR/SUB CRITERIA: Payment of Monies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03180000	.033825697
Oil & Gas	9	.05244444	.038458130

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.236	16.086	.234	NS	0.5712

FACTOR/SUB CRITERIA: Security & Access Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02280000	.020900824
Oil & Gas	9	.02133333	.014026760

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.181	15.808	.859	NS	0.0839

FACTOR/SUB CRITERIA: Responsible Management & Maintenance Team

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03110000	.031114305
Oil & Gas	9	.02611111	.013185640

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.463	12.395	.651	NS	0.2252

FACTOR/SUB CRITERIA: Maintenance Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.03240000	.034747342
Oil & Gas	9	.01988889	.013467038

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.054	11.883	.313	NS	0.5189

FACTOR/SUB CRITERIA: Cleaning/House Keeping

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01810000	.011694728
Oil & Gas	9	.01600000	.014413535

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.346	15.463	.734	NS	0.1608

FACTOR/SUB CRITERIA: Safety Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02770000	.029694930
Oil & Gas	9	.02722222	.010353475

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.048	11.362	.963	NS	0.02386

FACTOR/SUB CRITERIA: Fire Prevention & Protection

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02620000	.021059703
Oil & Gas	9	.03122222	.016783755

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.577	16.782	.571	NS	0.2654

FACTOR/SUB CRITERIA: After Hours Operations

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01540000	.012139925
Oil & Gas	9	.02277778	.014480830

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.196	15.728	.249	NS	0.5542

FACTOR/SUB CRITERIA: Toilet & Sanitary Fittings

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02040000	.012312595
Oil & Gas	9	.01855556	.008748016

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.379	16.195	.709	NS	0.1751

FACTOR/SUB CRITERIA: Air Conditioning & Ventilation

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02210000	.012547244
Oil & Gas	9	.02775556	.015076066

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.883	15.670	.390	NS	0.4094

FACTOR/SUB CRITERIA: Electrical System & Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02280000	.013389880
Oil & Gas	9	.02800000	.014370108

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.813	16.456	.428	NS	0.3746

FACTOR/SUB CRITERIA: Modern IT & Telecommunication System

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02170000	.013208162
Oil & Gas	9	.02977778	.019395733

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.049	13.917	.312	NS	0.4955

FACTOR/SUB CRITERIA: Building Automation & EMS

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation

Finance/Banking	10	.01580000	.011545081
Oil & Gas	9	.02500000	.014309088

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.532	15.416	.146	NS	0.7116

FACTOR/SUB CRITERIA: Control of Building Services

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01720000	.010840254
Oil & Gas	9	.02400000	.013747727

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.188	15.222	.253	NS	0.5531

FACTOR/SUB CRITERIA: Passenger Lift Capacity & Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01970000	.010520351
Oil & Gas	9	.03577778	.020234734

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-2.138	11.748	.050	S	1.0455

FACTOR/SUB CRITERIA: Car Park Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.02060000	.012001852
Oil & Gas	9	.02688889	.014581190

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.020	15.581	.323	NS	0.4731

FACTOR/SUB CRITERIA: Building Wayfinding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.01490000	.012269655
Oil & Gas	9	.02300000	.014696938

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.296	15.695	.214	NS	0.6007

FACTOR/SUB CRITERIA: Rental Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.09910000	.043585038
Oil & Gas	9	.08400000	.073099248

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.539	12.776	.599	NS	0.2588

FACTOR/SUB CRITERIA: Cost of Fit Out

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.05190000	.058285600
Oil & Gas	9	.04466667	.047478943

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.298	16.856	.770	NS	0.1367

FACTOR/SUB CRITERIA: Total Occupancy Cost

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
Finance/Banking	10	.09010000	.077365582
Oil & Gas	9	.09133333	.093463897

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.031	15.627	.976	NS	0.0144

T TEST

ICT & Media and Oil &Gas

FACTOR/SUB CRITERIA: Branding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.06522222	.096582578
Oil & Gas	9	.02633333	.029945784

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.154	9.524	.277	NS	0.6147

FACTOR/SUB CRITERIA: Access to Market

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03600000	.030066593
Oil & Gas	9	.03722222	.046799513

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.066	13.643	.948	NS	0.0318

FACTOR/SUB CRITERIA: Access to Amenities

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03866667	.025401772
Oil & Gas	9	.06388889	.063760184

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.102	10.477	.295	NS	0.5657

FACTOR/SUB CRITERIA: Access to Public Transportation & Terminal

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03355556	.020439613
Oil & Gas	9	.08255556	.055184036

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-2.498	10.154	.031	S	1.2958

FACTOR/SUB CRITERIA: Level of Criminal Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.05797778	.068130422

Oil & Gas	9	.07277778	.029511768

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.598	10.900	.562	NS	0.3031

FACTOR/SUB CRITERIA: Termination Clause

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.04833333	.036721928
Oil & Gas	9	.04088889	.025339911

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.501	14.211	.624	NS	0.2399

FACTOR/SUB CRITERIA: Payment of Monies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.06444444	.040487995
Oil & Gas	9	.05244444	.038458130

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.645	15.958	.528	NS	0.3040

FACTOR/SUB CRITERIA: Security and Access Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02422222	.013507200
Oil & Gas	9	.02133333	.014026760

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.445	15.977	.662	NS	0.2098

FACTOR/SUB CRITERIA: Responsible Management & Maintenance Team

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03011111	.019035785
Oil & Gas	9	.02611111	.013185640

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.518	14.240	.612	NS	0.2482

FACTOR/SUB CRITERIA: Maintenance Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.01644444	.006002314
Oil & Gas	9	.01988889	.013467038

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.701	11.058	.498	NS	0.3538

FACTOR/SUB CRITERIA: Cleaning Housekeeping

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.01477778	.007479602
Oil & Gas	9	.01600000	.014413535

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.226	12.017	.825	NS	0.1116

FACTOR/SUB CRITERIA: Safety Policies

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.01922222	.012407435
Oil & Gas	9	.02722222	.010353475

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.485	15.503	.158	NS	0.7029

FACTOR/SUB CRITERIA: Fire Prevention & Protection

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03288889	.025250963
Oil & Gas	9	.03122222	.016783755

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.165	13.914	.871	NS	0.0793

FACTOR/SUB CRITERIA: After Hours Operations

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.01744444	.011270660
Oil & Gas	9	.02277778	.014480830

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.872	15.090	.397	NS	0.4142

FACTOR/SUB CRITERIA: Toilet Sanitary Fittings

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.03844444	.045505799
Oil & Gas	9	.01855556	.008748016

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.288	8.590	.231	NS	0.7331

FACTOR/SUB CRITERIA: Air Conditioning & Ventilation

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02277778	.014906188
Oil & Gas	9	.02775556	.015076066

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.704	15.998	.491	NS	0.3320

FACTOR/SUB CRITERIA: Electrical System & Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02777778	.022857044
Oil & Gas	9	.02800000	.014370108

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.025	13.470	.981	NS	0.0119

FACTOR/SUB CRITERIA: Modern IT & Telecommunication

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.04833333	.051512134
Oil & Gas	9	.02977778	.019395733

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	1.011	10.224	.335	NS	0.5233

FACTOR/SUB CRITERIA: Building Automation & EMS

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02444444	.018194169
Oil & Gas	9	.02500000	.014309088

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.072	15.158	.944	NS	0.0341

FACTOR/SUB CRITERIA: Control of Building Services

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02066667	.016140012
Oil & Gas	9	.02400000	.013747727

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.472	15.605	.644	NS	0.2230

FACTOR/SUB CRITERIA: Passenger Lifts Capacity & Control

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02166667	.014815532
Oil & Gas	9	.03577778	.020234734

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-1.688	14.663	.113	NS	0.8051

FACTOR/SUB CRITERIA: Car Park Provision

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02744444	.019513528
Oil & Gas	9	.02688889	.014581190

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.068	14.810	.946	NS	0.0325

FACTOR/SUB CRITERIA: Building Wayfinding

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.02077778	.019324711
Oil & Gas	9	.02300000	.014696938

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.275	14.934	.787	NS	0.1306

FACTOR/SUB CRITERIA: Rental Rate

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation

ICT & Media	9	.08811111	.067127573
Oil & Gas	9	.08400000	.073099248

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.124	15.885	.903	NS	0.0586

FACTOR/SUB CRITERIA: Cost of Fit Out

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.05955556	.077769067
Oil & Gas	9	.04466667	.047478943

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	.490	13.236	.632	NS	0.2377

FACTOR/SUB CRITERIA: Total Occupancy Cost

Descriptive Statistics

Sector	Sum	Mean	Standard Deviation
ICT & Media	9	.08688889	.080733271
Oil & Gas	9	.09133333	.093463897

T-Test Results

	t	df	Sig. (2-tailed)	P<0.5	Effect Size
Equal variances not assumed	-.108	15.669	.915	NS	0.0510

Appendix H

ANOVA results

1. Sub Criteria: Branding/Image

Sectors	No	Mean	Variance
Finance/Banking	10	.04964000	0.0021211
ICT & Media	9	.06522222	0.0093282
Oil & Gas	9	.02633333	0.0008967
Total	28	.04715714	0.0039923

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.007	2	.003	.855	.437
Within Groups	.101	25	.004		
Total	.108	27			

2. Sub Criteria: Access to Market

Sectors	No	Mean	Variance
Finance/Banking	10	.07840000	0.00567
ICT & Media	9	.03600000	0.00090
Oil & Gas	9	.03722222	0.00219
Total	28	.05153571	0.00322

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.011	2	.006	1.853	.178
Within Groups	.076	25	.003		
Total	.087	27			

3. Sub Criteria: Access to Amenities

Sectors	No	Mean	Variance
Finance/Banking	10	.05650000	0.0015174
ICT & Media	9	.03866667	0.0006453
Oil & Gas	9	.06388889	0.0040654
Total	28	.05314286	0.0020141

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.003	2	.002	.740	.487
Within Groups	.051	25	.002		
Total	.054	27			

4. Sub Criteria: Access to Public Trans

Sectors	No	Mean	Variance
Finance/Banking	10	.06260000	0.0019318
ICT & Media	9	.03355556	0.0004178
Oil & Gas	9	.08255556	0.0030453
Total	28	.05967857	0.0020751

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.011	2	.005	3.032	.066
Within Groups	.045	25	.002		
Total	.056	27			

5. Sub Criteria: Level of Criminal rate

Sectors	No	Mean	Variance
Finance/Banking	10	.05980000	0.0028582
ICT & Media	9	.05797778	0.0046418
Oil & Gas	9	.07277778	0.0008709
Total	28	.06338571	0.00263

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.001	.212	.810
Within Groups	.070	25	.003		
Total	.071	27			

6. Sub Criteria: Termination Clause

Sectors	No	Mean	Variance
Finance/Banking	10	.05510000	0.0012957
ICT & Media	9	.04833333	0.0013485
Oil & Gas	9	.04088889	0.0006421
Total	28	.04835714	0.0010571

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.000	.433	.653
Within Groups	.028	25	.001		
Total	.029	27			

7. Sub Criteria: Payment of Monies

Sectors	No	Mean	Variance
Finance/Banking	10	.03180000	0.0011442
ICT & Media	9	.06444444	0.0016393
Oil & Gas	9	.05244444	0.001479
Total	28	.04892857	0.0014984

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.005	2	.003	1.848	.178
Within Groups	.035	25	.001		
Total	.040	27			

8. Sub Criteria: Security & Access Control

Sectors	No	Mean	Variance
Finance/Banking	10	.02280000	0.0004368
ICT & Media	9	.02422222	0.0001824
Oil & Gas	9	.02133333	0.0001967
Total	28	.02278571	0.0002594

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.067	.935
Within Groups	.007	25	.000		
Total	.007	27			

9. Sub Criteria: Responsible Mgmt Maint

Sectors	No	Mean	Variance
Finance/Banking	10	.03110000	0.0009681
ICT & Media	9	.03011111	0.0003624
Oil & Gas	9	.02611111	0.0001739
Total	28	.02917857	0.0004864

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.124	.884
Within Groups	.013	25	.001		
Total	.013	27			

Between Groups	.000	2	.000	.124	.884
Within Groups	.013	25	.001		
Total	.013	27			

10. Sub Criteria: Maintenance Policies

Sectors	No	Mean	Variance
Finance/Banking	10	.03240000	0.0012074
ICT & Media	9	.01644444	3.603E-05
Oil & Gas	9	.01988889	0.0001814
Total	28	.02325000	0.0005171

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.001	1.344	.279
Within Groups	.013	25	.001		
Total	.014	27			

11. Sub Criteria: Cleaning/Housekeeping

Sectors	No	Mean	Variance
Finance/Banking	10	.01810000	0.0001368
ICT & Media	9	.01477778	5.594E-05
Oil & Gas	9	.01600000	0.0002077
Total	28	.01635714	0.0001257

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.202	.818
Within Groups	.003	25	.000		
Total	.003	27			

12. Sub Criteria: Safety Policies

Sectors	No	Mean	Variance
Finance/Banking	10	.02770000	0.0008818
ICT & Media	9	.01922222	0.0001539
Oil & Gas	9	.02722222	0.0001072
Total	28	.02482143	0.0003867

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.520	.601
Within Groups	.010	25	.000		
Total	.010	27			

13. Sub Criteria: Fire Prev & Protec

Sectors	No	Mean	Variance
Finance/Banking	10	.02620000	0.0004435
ICT & Media	9	.03288889	0.0006376
Oil & Gas	9	.03122222	0.0002817
Total	28	.02996429	0.0004289

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.257	.776
Within Groups	.011	25	.000		
Total	.012	27			

14. Sub Criteria: After Hours Ops

Sectors	No	Mean	Variance
Finance/Banking	10	.01540000	0.0001474

	ICT & Media	9	.01744444	0.000127
	Oil & Gas	9	.02277778	0.0002097
	Total	28	.01842857	0.0001589

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.842	.443
Within Groups	.004	25	.000		
Total	.004	27			

15. Sub Criteria: Toilet & Sanitary

Sectors	No	Mean	Variance
Finance/Banking	10	.02040000	0.0001516
ICT & Media	9	.03844444	0.0020708
Oil & Gas	9	.01855556	7.653E-05
Total	28	.02560714	0.0007683

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.002	2	.001	1.484	.246
Within Groups	.019	25	.001		
Total	.021	27			

16. Sub Criteria: Air Con & Vent

Sectors	No	Mean	Variation
Finance/Banking	10	.02040000	0.0001574
ICT & Media	9	.03844444	0.0002222
Oil & Gas	9	.01855556	0.0002273
Total	28	.02560714	0.0001922

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.439	.650
Within Groups	.005	25	.000		
Total	.005	27			

17. Sub Criteria: Electrical System & Provision

Sectors	No	Mean	Variance
Finance/Banking	10	.02280000	0.0001793
ICT & Media	9	.02777778	0.0005224
Oil & Gas	9	.02800000	0.0002065
Total	28	.02607143	0.0002819

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.280	.758
Within Groups	.007	25	.000		
Total	.008	27			

18. Sub Criteria: Modern It & Telecomm

Sectors	No	Mean	Variance
Finance/Banking	10	.02170000	0.0001745
ICT & Media	9	.04833333	0.0026535
Oil & Gas	9	.02977778	0.0003762
Total	28	.03285714	0.0010849

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.003	2	.002	1.688	.205
Within Groups	.026	25	.001		

Total	.029	27

19. Sub Criteria: Bdg Automation & EMS

Sectors	No	Mean	Variance
Finance/Banking	10	.01580000	0.0001333
ICT & Media	9	.02444444	0.000331
Oil & Gas	9	.02500000	0.0002047
Total	28	.02153571	0.0002222

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.000	1.169	.327
Within Groups	.005	25	.000		
Total	.006	27			

20. Sub Criteria: Control of Bdg Services

Sectors	No	Mean	Variance
Finance/Banking	10	.01720000	0.0001175
ICT & Media	9	.02066667	0.0002605
Oil & Gas	9	.02400000	0.000189
Total	28	.02050000	0.0001805

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.589	.562
Within Groups	.005	25	.000		
Total	.005	27			

21. Sub Criteria: Passenger Lifts Capacity

Sectors	No	Mean	Variance
Finance/Banking	10	.01970000	0.0001107
ICT & Media	9	.02166667	0.0002195
Oil & Gas	9	.03577778	0.0004094
Total	28	.02550000	0.0002758

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.001	2.943	.071
Within Groups	.006	25	.000		
Total	.007	27			

22. Sub Criteria: Car Park Provision

Sectors	No	Mean	Variance
Finance/Banking	10	.02060000	0.000144
ICT & Media	9	.02744444	0.0003808
Oil & Gas	9	.02688889	0.0002126
Total	28	.02482143	0.0002342

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.576	.569
Within Groups	.006	25	.000		
Total	.006	27			

23. Sub Criteria: Bdg Wayfinding

Sectors	No	Mean	Variance

	Finance/Banking	10	.01490000	0.0001505
	ICT & Media	9	.02077778	0.0003734
	Oil & Gas	9	.02300000	0.000216
	Total	28	.01939286	0.0002373

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.692	.510
Within Groups	.006	25	.000		
Total	.006	27			

24. Sub Criteria: Rental Rate

Sectors	No	Mean	Variance
Finance/Banking	10	.09910000	0.0018997
ICT & Media	9	.08811111	0.0045061
Oil & Gas	9	.08400000	0.0053435
Total	28	.09071429	0.003595

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.001	.153	.859
Within Groups	.096	25	.004		
Total	.097	27			

25. Sub Criteria: Cost of Fit Out

Sectors	No	Mean	Variance
Finance/Banking	10	.05190000	0.0033972
ICT & Media	9	.05955556	0.006048
Oil & Gas	9	.04466667	0.0022543
Total	28	.05203571	0.0036293

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.001	2	.000	.129	.880
Within Groups	.097	25	.004		
Total	.098	27			

26. Sub Criteria: Total Occupancy Cost

Sectors	No	Mean	Variance
Finance/Banking	10	.09010000	0.0059854
ICT & Media	9	.08688889	0.0065179
Oil & Gas	9	.09133333	0.0087355
Total	28	.08946429	0.0065182

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.000	2	.000	.007	.993
Within Groups	.176	25	.007		
Total	.176	27			

Appendix I

List of Presentations at Conferences

1. Yasmin Mohd Adnan, Tenant Renewal Decision for Occupation at Purpose Built Office Buildings within the Central Business District , Kuala Lumpur, Malaysia, Doctoral Presentation, *15th Annual European Real Estate Society Conference*, Krakow, Poland, 18-21 June 2008

2. Yasmin Mohd Adnan and Tey Hue See, Tenants' Acceptance level of Current Tenancy Terms for Selected Office Buildings in Kuala Lumpur, Malaysia, proceeding of the *13th Asian Real Estate Society Conference (AsRES) Annual Meeting and International Conference*, Shanghai, China, 12-15 July 2008

3. Yasmin Mohd Adnan and Md Nasir Daud, Office Space Decision by Tenants of Purpose Built Office Buildings in CBD, Kuala Lumpur- A preliminary review of factors, proceedings of the *4th Asean Post Graduate Seminar*, University of Malaya, Kuala Lumpur, 14-16 April 2009

4. Yasmin Mohd Adnan, Md Nasir Daud, Identification of Important Factors by Tenants for Office Space Decision by Tenants in Kuala Lumpur city centre, Malaysia - Experts' Views, proceeding of the *16th Pacific Rim Real Estate Society*, Wellington, New Zealand, 24-27 January 2010

5. Yasmin Mohd Adnan, Md Nasir Daud, Identification of Important Factors by Tenants for Office Space Decision at Purpose Built Office Buildings in CBD, Kuala Lumpur, presentation at *15th Asian Real Estate Society Conference*, Kaohsiung, Taiwan, 9th-12th July 2010

6. Yasmin Mohd Adnan, Md Nasir Daud, Tenant Preference for Office Space at City Centre of Kuala Lumpur, presentation at the *17th Pacific Rim Real Estate Society Conference*, Australia, 17-19 January 2011

7. Yasmin Mohd Adnan, Md Nasir Daud, Tenant Preference for Office Space at City Centre of Kuala Lumpur – AHP Approach, presentation at *16th Asian Real Estate Society and AREAUEA Joint International Conference*, Jeju Island, Korea , 11th-14th July 2011

List of Publications

1. Yasmin Mohd Adnan, Md Nasir Daud (2010), Factors Influencing Office Building Occupation Decision by Tenants in Kuala Lumpur city centre – a Delphi Study, *Journal of Design and the Built Environment*, , Vol 6, June 2010

2. Yasmin Mohd Adnan, Md Nasir Daud (2011), Office Occupation by Tenants at city centre of Kuala Lumpur, Malaysia – a Conceptual Approach, the *Malaysian Surveyor* (the Professional Journal of the Institution of Surveyors Malaysia), Vol 47.1

3. Yasmin Mohd Adnan, Md Nasir Daud, Md Najib Razali (2012), Property Specific Criteria for Office Occupation by Tenants of Purpose Built Office Buildings in Kuala Lumpur Malaysia, *Property Management* , Vol 2 (2) (Emerald, UK)