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Key Factors Affecting Valuation Accuracy for Petrol Filling Stations

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Abstract

Valuation of Petrol stations is critical for making informed investment decisions and accurate financial reporting. Petrol stations provide essential services to consumers, including the sale of fuel, convenience store items, car washes, and vehicle maintenance. However, there are significant valuation errors, biases, and variations stemming from differing methodologies and market expectations. To enhance the valuation accuracy of petrol stations, it is essential to identify and address these influencing factors systematically. This research aims to identify factors and evaluate the most significant factor affecting the accuracy of valuing petrol filling stations. This research adopted the quantitative method, which involves distributing questionnaires to the 100 respondents consisting of valuers and assistant valuer officers of the Department of Valuation and Property Services (JPPH) in Selangor. The data obtained was computed using SPSS software as descriptive analysis. This research findings reveal four factors affecting the valuation accuracy of petrol filling station, with the 'Valuation Method' factor being the most crucial in achieving more accurate in valuing these types of properties. The findings serve as a guide and reference for the JPPH to compute and value petrol stations accurately.

1. Introduction

The value of petrol station properties is influenced by several conditions, including economic health, interest rates, and supply and demand, which play a significant role in determining the value of petrol station properties. Strong economies with low unemployment rates and high consumer spending tend to boost demand for commercial spaces, leading to higher property values.

Conversely, economic downturns and high interest rates can lower property values. Location is another crucial factor in determining petrol station value. Properties near popular amenities and with easy access to transportation networks tend to attract more customers and generate higher foot traffic, leading to higher property values.

Economic indicators such as job growth, population growth, and overall economic stability also influence a property's desirability and value. A petrol station physical characteristics such as size, layout, and condition, also impact its value.

Larger properties with well-designed layouts and well-maintained buildings in good condition tend to command higher values. Unique architectural designs and features can also enhance the appeal and value of a property. Income potential is a critical factor in determining petrol station value. The current and potential

rental income of a property significantly impacts its value. Properties with stable, longterm tenants and high occupancy rates tend to command higher values. Lower operating expenses relative to rental income can also increase the property's net operating income (NOI) and enhance its value. Finally, legal and regulatory factors, such as zoning regulations and environmental considerations, also significantly determine petrol stations. Understanding these factors is crucial for accurately assessing the value of petrol station and making informed decisions about buying, selling, or leasing

1.1 Research Background

The value of petrol stations is influenced by several conditions, including economic health, interest rates, and supply and demand, which play a significant role in determining the value of petrol stations. Strong economies with low unemployment rates and high consumer spending tend to boost demand for commercial spaces, leading to higher property values. Many petrol stations now include convenience stores that offer a range of products from snacks to automotive supplies. This diversification caters to consumer needs beyond fuel, enhancing overall customer satisfaction (Sjöstrand, 2002). According to research by Shukor et al. (2022), petrol stations that successfully incorporate F&B offerings can significantly increase overall sales, as these products often have higher profit margins than fuel (Shukor et al., 2022).

Moreover, Selangor's economy being one of Malaysia's most developed states, recorded a 5% growth in 2021, which could positively influence the petrol station industry's growth. As of today, there are no existing studies made in Malaysia about the accuracy of valuation. A study found that significant differences in the method used could affect the derived value of the petrol station by up to nine per cent difference (Czaplinska et al., 2017)

Another study by Mirosława Czaplińska in 2017 emphasises the importance of considering the specific operating models and market conditions in valuing fuel stations. They are suggesting that the valuation process should be tailored to the unique characteristics of each market, including the types of fuel stations, their operating models, and the local market conditions. The study made by Mirosława Czaplińska proves the existence of inaccuracy in valuing petrol stations.

The petrol station valuations are critical for investment decisions and financial reporting; however, they are often affected by significant valuation errors, biases, and variations stemming from differing methodologies and market expectations. Research indicates that valuation practices are influenced by confirmation bias, where valuers may favour information that confirms their preconceived notions about property value, leading to inconsistent outcomes (Gallimore, 1996). Additionally, variations in valuation accuracy can arise from the lack of standardised methodologies across different valuers and the inherent uncertainty in property markets (Mallinson & French, 2000). This inconsistency undermines valuation's reliability and poses risks to financial soundness in broader economic contexts (Case & Watcher, 2005). Therefore, there is an alarming need to investigate how these factors impact the valuation of petrol stations, which possess distinct operational characteristics and market dynamics compared to other property types.

1.2 Problem Statements

The accuracy of petrol station valuations is often compromised by various factors, including location, which affects customer traffic and sales potential; market conditions, such as fluctuating fuel prices and competition; and property characteristics like size, age, and condition (Lizieri & VenmoreRowland, 1991; Hager & Lord, 1985). Additionally, the methodologies used for valuation can lead to inconsistent results depending on how these factors are assessed (Owusu-Ansah, 2012). Inaccurate valuations can have significant consequences that can impact community planning and development decisions, as local governments rely on accurate property assessments for zoning, infrastructure investment, and tax revenue calculations. To improve valuation accuracy, it is essential to identify and address these influencing factors systematically. Implementing standardised valuation practices that consider location dynamics, market trends, and property types will enhance decision-making for stakeholders involved in urban development and community services (Adair & Hutchison, 2005; Kaluthanthri & Hippola, 2023).

Although the study identifies several factors influencing the accuracy of petrol station valuations, previous research has not specified which of these factors is the most significant. This gap in the literature raises important questions regarding factors affecting petrol station valuation accuracy, particularly for petrol and filling stations. Specifically, it prompts an investigation into both the factors affecting the valuation accuracy of these properties and the identification of the most significant factor influencing their valuation accuracy

1.3 Research Questions

(i) What are the factors affecting the accuracy of petrol station valuation?
(ii) What is the most significant factor affecting the accuracy of valuing petrol station?

1.4 Research Objectives

(i) Identify factors affecting the accuracy of valuing petrol stations.
(ii) Evaluate the most significant factor affecting the valuation accuracy of petrol station.

1.5 Research Scope

This research aims to investigate the significant factors that affect the accuracy of petrol station valuation in Selangor, Malaysia. The research focuses on petrol stations to provide a comprehensive understanding of the factors influencing their value. The target respondents focused on valuer and assistant valuer officers in The Department of Valuation and Property Services (JPPH) across Selangor.

1.6 Research significance

(a) Regulatory Bodies
Accurate valuations ensure compliance with regulatory standards and prevent fraudulent practices among Board of Valuers, Appraisers, Estate Agents and Property Managers (BOVAEP), The Department of Valuation and Property Services (JPPH) and Royal Institute of Surveyors Malaysia (RISM)

(b) Business Owners
Accurate valuations help business owners make informed decisions about their properties, including whether to develop, sell, or hold onto them

(c) Buyers
Accurate valuations help buyers make informed decisions about their investments and ensure they are not overpaying for a property

(d) Researcher
The findings of this research can be used as a guide and reference for researchers in the future, particularly in the field of real estate valuation

2. Literature Review

2.1 Terms and Definitions

2.1.1 Special Property

According to the Malaysian Valuation Standards (MVS), a special property is defined as a property that possesses an extraordinary element of value over and above Market Value. Special Value could arise due to physical, functional, or economic associations of the property with other assets, such as an adjoining asset. This increment of value is specific to a particular owner, user, or prospective owner or user of the property, rather than being applicable to the market at large. Special Value is relevant only to a purchaser with a special interest in the property and may be associated with elements of Going Concern Value and Investment Value or Worth.

2.1.2 Non-Specialised Property

According to the Malaysian Valuation Standards (MVS), a special property is defined as a property that possesses an extraordinary element of value over and above Market Value. Special Value could arise due to physical, functional, or economic associations of the property with other assets, such as an adjoining asset. This increment of value is specific to a particular owner, user, or prospective owner or user of the property, rather than being applicable to the market at large. Special Value is relevant only to a purchaser with a special interest in the property and may be associated with elements of Going Concern Value and Investment Value or Worth.

2.1.3 Accuracy

The Malaysian Valuation Standards (MVS) and the Board of Valuers, Appraisers, Estate Agents and Property Managers (BOVEAP) emphasise the importance of accuracy in property valuations. BOVEAP emphasises that the primary purpose of valuation standards is to provide clients and valuers with an accurate understanding of the concepts and bases of value. Accurate valuations are crucial for issues of accountability, transparency and corporate governance (Yahya, Z., Razali, M. N., & Abdul, Z.) Accuracy in real estate valuation is crucial for informed decision-making by buyers, sellers, and financial institutions in Malaysia. Several factors influence valuation accuracy, including location, market trends, property condition, comparative market analysis, and professional valuers.

2.2 Commercial Property

Commercial property, investment property or income property refers to real estate intended to generate profit through capital gains or rental income. It encompasses a wide range of properties, including office buildings, retail spaces, hotels, warehouses, and multifamily housing complexes (Geltner et al., 2014). The classification of a property as commercial has significant implications for financing, taxation, and legal considerations (Brueggeman & Fisher, 2011)

The commercial property market deals with properties held for investment purposes, such as retail outlets, shops, shopping complexes, malls, hotels, offices, etc. (Usman, 2021) Typically, rental housing and investment properties are considered 'commercial property' (Mehrhoff, J., & Eurostat. 2017).

2.3 Petrol Station Business

Petrol station business operations involve managing the day-to-day activities of a fuel retail outlet, including sales, maintenance, and customer service. According to research, the location of a petrol station is a crucial factor in determining its sales performance, with proximity to residential and commercial areas, limited competition, and easy access being key components of a good location (Šafranić et al., 2017) (AYUK, 2019). The number of fuel pumps and additional facilities such as lube bays, offices, and marts can also impact sales volumes (Gill, 2011)

Research by Mat Saad and Abdul Wahid (2020) highlights that the development of convenience stores within petrol stations has seen a dramatic change, with retailers moving towards a standardised image to reflect their seriousness in expanding their retail business beyond just fuel sales (Mat Saad & Abdul Wahid, 2020). According to Dimoso (2023), future retail fuel stations will focus on customer wellbeing by providing spaces for relaxation and interaction rather than merely serving as refueling points (Dimoso, 2023).

Many petrol stations now include convenience stores that offer a range of products from snacks to automotive supplies. This diversification caters to consumer needs beyond fuel, enhancing overall customer satisfaction (Sjöstrand, 2002). These additional services enhance customer loyalty by providing one-stop solutions for motorists (Dimoso, 2023). According to research by Shukor et al. (2022), petrol stations that successfully incorporate F&B offerings can see significant increases in overall sales, as these products often have higher profit margins than fuel (Shukor et al., 2022).

Furthermore, the deregulation of the downstream petroleum sector has led to increased competition and reduced profit margins, making it essential for petrol station operators to adopt strategies such as offering additional services and activities to complement their fuel sales (C. Uzochukwu et al., 2018).

Petrol stations are valued based on the Malaysian Valuation Standards (MVS) using the Depreciated Replacement Cost (DRC) basis. This approach takes into account the cost of replacing the petrol station with a similar one, adjusted for depreciation and obsolescence

According to the Royal Institution of Chartered Surveyors (RICS), the valuation of petrol stations involves considering the trade-related aspects of the property, including the maintainable throughput, pricing policies, and material changes of circumstances (MCCs). The valuation approach is based on the trading performance and profits method, which takes into account the income generated by the station, including the sales of fuel and other commodities.

Under the International Valuation Standards (IVS) using the income approach, which involves estimating the property's income potential and then applying a capitalisation rate to arrive at its value. The income approach is used to value petrol stations because they generate income through the sale of fuel and other commodities, such as convenience store items and car washes.

2.4 Overview of Valuation Methods

2.4.1 Comparison Method

The comparison method is the most commonly used property valuation approach. The comparison method is generally not suitable for valuing special properties like petrol stations that lack sufficient comparable transaction evidence (Baum & Crosby, 2008; Wyatt, 2013; Isaac & Steley, 1991).

2.4.2 Investment Method

This method is commonly used for income-generating properties such as commercial and residential properties. The investment method involves calculating the net operating income (NOI) of the property and then applying a capitalisation rate to arrive at the property's value. The capitalisation rate is a function of the property's risk, market conditions, and the investor's required rate of return. The investment method is a widely used and accepted approach in the real estate industry, and it is often used in conjunction with other valuation methods to provide a comprehensive understanding of a property's value.

2.4.3 Residual Method

It is also known as the Depreciated Replacement Cost, is employed primarily in the valuation of properties with development potential or those requiring significant refurbishment (Miles, Berens, & Weiss, 2000). It involves deducing the 'residual' value of the property after accounting for the costs of development and the associated depreciation, providing a 'residual' value reflective of its current state.

2.4.4 Discounted Cash Flow Method

A dynamic valuation approach that projects the future cash flows of a property and discounts them to their present value (Damodaran, 2012). This method is intricate, incorporating assumptions about rental growth, occupancy rates, and discount rates, offering a forward-looking valuation that encapsulates the property's financial prospects.

2.4.5 Profit Method

The profit method is tailored for properties where the value is essentially tied to their ability to generate profits, such as hotels or restaurants (Baum, 2009). This method scrutinises the revenue streams and operating expenses to ensure a value that is reflective of the business's profitability. It involves estimating the gross earnings from the business, taking into account historical data and future outlook, and then capitalising the net income to arrive at the market value (Isaac & Steley, 1991).

2.4.6 Cost Method

The profit method is tailored for properties where the value is essentially tied to their ability to generate profits, such as hotels or restaurants (Baum, 2009). This method scrutinises the revenue streams and operating expenses to ensure a value that is reflective of the business's profitability. It involves estimating the gross earnings from the business, taking into account historical data and future outlook, and then capitalising the net income to arrive at the market value (Isaac & Steley, 1991).

Table 1: Valuation Method and Property Types Summary Source: Researcher (2025)

Property Types VS Valuation Method	Commercial Property	Special Property	Petrol Filling Station
Comparison Method			Scarrett (2008); Isaac & O'Leary (2012)
Cost Method	French, N. (2004)	French, N. (2004)	French, N. (2004)
Discounted Cashflow			
Profit Method			Scarrett (2008); Isaac & O'Leary (2012)
Residual Method	Lemen, J. (2020)		

Table 1 concludes cost method is the most suitable for all three property types. The Petrol Filling Station is suitable for comparison, cost and profit methods. Commercial Property is suitable for using cost and residual methods. Special property suitable with the cost method

2.5 Factors Affecting Property Valuation Accuracy

2.5.1 Availability of Market Data

Valuers rely heavily on recent sales of comparable properties to estimate market valuers Shapiro et al. (2019). Limited or outdated market data can reduce the reliability of the valuation conclusion.

2.5.2 Reliability of Market Data

Valuers rely heavily on recent sales of comparable properties to estimate market valuers Shapiro et al. (2019). Outdated market data can reduce the reliability of the valuation conclusion.

2.5.3 Property Characteristics

Accurately measuring and considering the subject property's size, condition, location, and other attributes is critical. Inaccurate property data can lead to flawed valuations. A property's physical, legal, and economic characteristics are crucial factors that affect its market value. Valuers must carefully analyse these characteristics and make appropriate adjustments to arrive at a reliable and well-reasoned opinion of value (Gaca, Zygmunt, and Gluszak. 2020).

2.5.4 Valuation Methodology

The choice of valuation approach (e.g. sales comparison, income capitalisation, cost) and proper application of the chosen method impact the reliability of the valuation. Using inappropriate methods for the property type can reduce accuracy (Liman, Amidu, and Levy. 2024].

2.5.5 Valuer's Judgment

The valuer's knowledge of the market, ability to analyse relevant data, and application of professional judgment are critical to producing an accurate valuation. Inexperienced valuers may struggle to arrive at well-supported value conclusions (Oyeyoade2012).

2.5.5 Valuer's Experience

Inexperienced valuers may struggle to arrive at well-supported value conclusions. Valuer's experience and expertise are essential factors in producing high-quality, well-reasoned property valuations that are reliable and defensible. The valuation process requires more than just applying standardised methods (Oyeyoade, 201].

2.5.6 Adherence to Valuation Standards

Following up-to-date valuation standards and guidelines, such as the RICS Red Book, helps ensure consistency and quality in the valuation process. According to Effiong (2015) deviating from established standards can undermine the credibility of the valuation.

Table 2: Summary of Factors Affecting Petrol Station Valuation
Source: Researcher (2025)

Researcher	Factor Affecting Accuracy	Summary from Past Research
Shapiro et al. (2019).	Availability of Market Data	• Availability of Market Data • Reliability of Market Data • Property Characteristics • Valuation Methodology • Valuer's Experience • Valuer" Judgment • Adherence to Valuation Standards Effiong, (2015). Adherence to Valuation Standards
Shapiro et al. (2019).	Reliability of Market Data	
Gaca, Zygmunt, and Gluszak (2020)	Property Characteristics	
Liman, Amidu, & Levy (2024).	Valuation Methodology	
Oyeyoade (2012)	Valuer's Experience	
Oyeyoade (2012)	Valuer's Judgement	

Table 2 shows factors affecting the accuracy of valuation. Seven factors are found: the availability and reliability of market data according to Shapiro et al. (2019), property characteristics according to Gaca, Zygmunt, and Gluszak (2020), valuation methodology based on Liman, Amidu, and Levy (2024), valuer's experience and judgment from Oyeyoade (2012), and adherence to valuation standards according to Effiong, (2015).

2.6 Conceptual Framework

The factors affecting the valuation accuracy are identified and designed into a conceptual framework as shown in Figure 1. The framework portrays a relationship between the independent variables, which are the factors affecting accuracy, and the dependent variables, which identify the most significant factor affecting petrol station valuation accuracy (Hizam & Kasim, 2023).

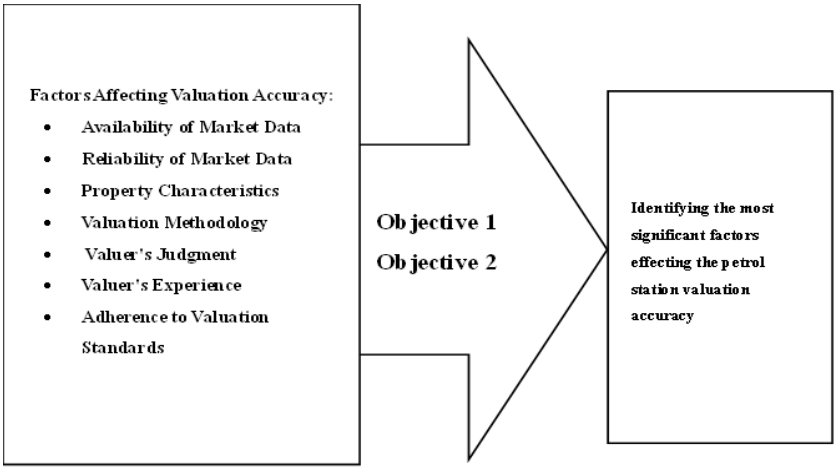

Figure 1: Conceptual Framework (Source: Researcher, 2025)

This conceptual research is designed to ensure a clear focus and direction throughout the research process. By outlining the research objectives in detail, this framework helps to ensure that the research continues to align with the established goals (Hizam & Kasim, 2023).

Based on Figure 1, systematic data collection has been carried out according to suitability criteria to ensure the research objectives are met. Therefore, using the right research instrument is important for gathering the necessary data for ongoing quantitative data collection, as shown in **Table 3**.

Table 3: Conceptual Framework (Quantitative Data Collection)

Research Objective	Method	Data Analysis	Findings
Objective 1	Quantitative Method (Questionnaire Instrument)	Descriptive Analysis	To identify factors affecting petrol station valuation accuracy
Objective 2		Frequency Analysis	To evaluate the most significant factors affecting petrol station valuation accuracy

3. Research Methodology

3.1 Research Design

The methodology used in this research is a quantitative method approach. The quantitative method called an instrument survey is used to achieve the research"s objectives.

(*a*) *Research Approach*

This research uses a quantitative approach because it is beneficial for collecting data in research studies due to its objectivity, reliability, and ability to generalise findings. Quantitative research involves gathering and analysing numerical data using statistical methods (Creswell, 2014).

(b) Research Population & Sampling

Research on population and sampling is a method that explains issues related to respondents, samples, and populations. The research area consists of 5 branches of Valuation and Property Service Departments (JPPH) in the state of Selangor, which becomes the sample for this research. This is because each JPPH branch has 20 staff consisting of Assistant Valuer Officers, Valuer Officers, and District Valuers, who become the respondents for this research. Therefore, 100 staff at each JPPH branch will be given the questionnaire. To calculate the sample size, the number of respondents is determined using Yamane's theory (1967), as follows:

$$4. \quad = \frac{100}{1 + 100(0.1)^2} = 50 \; respondents$$

3.2 Data Collection

The data collection method used is the distribution of questionnaires. Each question prepared by the researcher will be distributed online to the respondents. This research will use a 5-point Likert scale, including very agree, agree, neutral, disagree, and very disagree. The framework of the questionnaire is to be implemented to obtain information.

(*a*) *Research Instrument*

This instrument uses using questionnaire survey referring to **Table 4**

Table 4: Questionnaire Survey
Source: Researcher (2025)

PART 1 Respondent demography	Example question: • Age • Industry experience	Question outcome • Respondent information
PART 2 • Availability and Reliability of Market Data • Property Characteristics • Valuation Methodology • Valuer's Experience and Judgment • Adherence to Valuation Standards • Consideration of Legislation	Supported by: • Shapiro et al. (2019) • Gaca, Zygmunt, and Gluszak (2020) • Liman, Amidu, and Levy (2024) • Oyeyoade (2012) • Effiong, (2015)	• Using the Likert scale • 1 = Strongly Disagree • 2 = Disagree • 3 = Neutral • 4 = Agree • 5 = Strongly Agree
PART 3 The most significant factor that is affecting the accuracy of petrol station valuation.	The frequency, mean and standard deviation are used to determine the most significant factor.	

3.3 Pilot Test

Pilot studies are crucial for assessing feasibility and refining methodologies before larger research. While guidelines typically recommend 12 to 30 participants, some studies show that smaller samples can still be effective. For example, Wang (2016) tested a survey with just five respondents. According to Connelly (2008), a pilot sample size should be about 10% of the main research's sample size, allowing for preliminary insights with minimal resources. Seven (7) factors affecting the petrol station valuation were identified. Cronbach's alpha value of less than 0.6 is considered not reliable for the research (Bond & Fox, 2015).

Table 5: Reliability Test (Cronbach Alpha)
Source: Researcher (2025)

Factors	Cronbach Alpha
Reliability of Market Data	0.81
Availability of Market Data	**0.164**
Property Characteristics	**-1.7586E-13**
Valuation Methods	0.805
Valuer's Judgment	**-0.784**
Valuer's Experience	0.885
Adherence to Valuation Standards	0.825

Negative values for Cronbach's alpha often occur when item responses show very little variance, meaning that respondents provide similar answers across items. This lack of variability can lead to a situation where the total variance is lower than the sum of individual item variances, resulting in a negative alpha value (Tavakol & Dennick, 2011). As expressed in the formula:

$$\alpha = \frac{N\,c}{v + N - 1\,c}$$

Here, N represents the number of items, c is the average inter-item covariance, and v is the average variance. A negative alpha suggests that items may not be measuring the same construct or that there are issues with item formulation (Cortina, 1993). Based on the **Table 5** above, the findings from the pilot research reliability test indicate that the funding factor has a Cronbach's alpha value of less than 0.6, meaning that these items need to be discarded and are not suitable for use in the actual survey. Therefore, only four (4) factors will be considered because their reliability level is at a good, high, and effective level (Bond & Fox, 2015).

3.4 Data Analysis

The collected data from secondary sources will be presented. Using SPSS software, descriptive analysis will be performed on the data obtained from the distribution of questionnaires

(a) Descriptive Analysis

Statistical methods are used in this quantitative descriptive research to objectively and systematically characterise the features and patterns of the data. The conclusions drawn will include the values of the mean, median, and standard deviation.

(b) Frequency Analysis

The statistical method called frequency analysis is used to explain the minimum score and the distribution of frequencies for quantitative methods. The frequency of the data being studied is calculated, and the data is arranged based on the frequency distribution.

4 Findings

4.1 Response Rate

The response rate from several surveys has been collected, as stated in Chapter 3. A total of 51 respondents were considered for the data collection of the research distributed among the JPPH officers across Selangor, with the sample consisting of valuer and assistant valuer. A response rate of 58.82% was achieved, receiving completed survey tools back from 30 respondents. According to Taherdoost (2022), a 51.18% response rate is common. Dilman (2000) suggests a minimum of 50%, while Fowler (2013) recommends a minimum of 60%. The response rate is presented in Table 6 below.

Table 6: Responses Rate

Source: Researcher (2025)

Survey response	Frequency	Percentages (%)
The total of respondents needed	50	100%
The total of respondents missing	21	42%
The total of respondents obtained	30	60%

Table 6 shows the response rate of 60% exceeded the minimum rate according to Dilman (2000) and fulfilled the minimum recommendation according to Fowler (2013)

4.2 Respondent Demography

The frequency distribution and percentage of respondents are presented and discussed based on their demographic characteristics. **Table 7** shows the characteristics of the survey participants. Demographic information includes gender, age, position, and duration of work experience.

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Table 7: Respondent's Demography
Source: Researcher (2025)

Group	Criteria	Frequency	Percentage
Gender	Male	8	26.7%
	Female	22	73.3%
	Total	**30**	**100%**
Age	21-30	2	6.7%
	31-40	11	36.7%
	41-50	14	46.7%
	51-60	3	10%
	Total	**30**	**100%**
Industrial Experience Duration	Less than 5 years	4	13.3%
	5 to 10 years	6	20%
	10 to 15 years	6	20%
	15 to 20 years	7	23.3%
	20 to 25 years	4	13.3%
	25 to 30 years	3	10%
	Total	**30**	**100%**
Position	Valuer	15	50%
	Assistant Valuer	15	50%
	Total	**30**	**100%**

Table 7 shows that the majority of the respondents are female(73.3%) and the minority are male (26.7%). Part of the respondents are aged from 41 to 50 years old followed by 31 to 40 years old at 36.7%, 51 to 60 years old at 10% and 21 to 30 years old at 6.7%. Industrial experience duration of the respondents at 23.3% (15 to 20 years), a similar rate at 20% (5 to 10 years and 10 to 15 years) followed by the shared rate of 13.3% (less than 5 years and 20 to 25 years). The positions of the respondents are equally distributed at 50% (Valuer and Assistant Valuer).

4.3 Objective 1 – Identifying Factors Affecting the Accuracy of Valuing Petrol Station

After conducting a pilot test, only four (4) factors were considered for analysis. Significant factors affecting petrol station valuation (petrol station) are the reliability of market data, valuation method, valuer's experience, and adherence to valuation. Through the frequency analysis method, the frequency of answer selection on the Likert scale will be shown to see and evaluate the strength level of each element in the factor. Meanwhile, through the descriptive analysis method, the mean value for each factor will be shown in **Table 8** below.

Table 8: Descriptive Frequency Analysis on Factors Affecting the Petrol Station Valuation
Source: Researcher (2025

Group	Factor Code	Likert Scale					Mean	Mode	Standard Deviation
		1	2	3	4	5			
Reliability of Market Data	F1.1a	0	1	1	21	7	4.13	4	0.629
	F1.1b	0	4	4	19	3	3.70	4	0.837
	F1.1c	0	0	9	21	0	3.70	4	0.466
	F.1.2a	1	2	9	15	3	3.57	4	0.898
	F.1.2b	0	0	2	25	3	4.03	4	0.414
	F.1.2c	0	0	1	21	8	4.23	4	0.504
	F1.3a	0	0	1	21	8	4.23	4	0.504
	F1.3b	0	0	4	20	6	4.07	4	0.583
	F1.3c	0	0	3	19	8	4.17	4	0.592
Overall Average							**3.98**	**4**	**0.383**
Valuation Methods	F4.1	0	0	1	16	13	4.4	4	0.563
	F4.2	0	0	0	18	12	4.4	4	0.498
	F4.3	0	0	1	22	7	4.2	4	0.484
	F4.4	0	0	3	21	6	4.1	4	0.548
	F4.5	0	0	1	23	6	4.17	4	0.461
	F4.6	0	0	4	19	7	4.1	4	0.607
	F4.7	0	1	2	21	6	4.07	4	0.640
	F4.8	0	0	4	19	7	4.1	4	0.607
Overall Average							**4.19**	**4**	**0.362**
Valuer's Experience	F6.1	0	2	1	19	8	4.1	4	0.759
	F6.2	0	0	1	20	9	4.27	4	0.521
	F6.3	0	0	1	20	9	4.27	4	0.521
	F6.5	0	0	0	21	9	4.3	4	0.466
	F6.6	0	0	4	21	5	4.03	4	0.556
Overall Average							**4.19**		**0.453**
Adherence to Valuation Standards	F7.1	0	0	1	19	10	4.3	4	0.535
	F7.2	0	0	3	20	7	4.13	4	0.571
	F7.3	0	0	2	19	9	4.23	4	0.568
	F7.4	0	0	5	18	7	4.07	4	0.640
	F7.5	0	1	1	18	10	4.23	4	0.679

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F7.6	0	1	3	21	5	4.0	4	0.643
F7.7	0	0	6	20	4	3.93	4	0.583
F7.8	1	0	2	20	7	4.07	4	0.785
F7.9	0	0	3	16	11	4.27	4	0.640
Overall Average						**4.14**	**4**	**0.416**
Total Average						**4.13**	**4**	-

The majority of respondents assigned the scale values "strongly agree" and "agree" to several factors identifying factors affecting the accuracy of valuing petrol stations. However, there were only a few factors where respondents assigned the scale value "neutral". The analysis found that the elements of the factors from the descriptive analysis had an overall mean value of 4.13. Referring to the Likert scale used in the questionnaire, a scale value of ≥ 3 is considered relevant. Consequently, the mean value for the valuation method and valuer's experience had the highest overall average (4.19), followed by adherence to the valuation standard (4.14) and reliability of market data (3.25).

(a) Reliability Test

Table 9 shows the results of the reliability test for the actual survey of 31 items identifying factors affecting the accuracy of valuing petrol stations using Cronbach's alpha value indicator. The results show that the data collected for Cronbach's alpha value is 0.908, and this data is considered reliable. According to Yahaya et al. (2007), an alpha value in the range of 0.8 to 1 is considered highly reliable and valid.

Table 9: Reliability Test (Actual Survey)
Source: Researcher (2025)

Reliability of Data	
Cronbach Alpha	Number of Items
0.908	31

Table 9 shows the reliability of factors affecting the accuracy of petrol station valuation. Although seven (7) factors are found in the literature review, which is the availability and reliability of market data according to Oyeyoade (2012), property characteristics according to Gaca, Zygmunt, and Gluszak (2020), valuation methodology based on Liman, Amidu, and Levy (2024), valuer's experience and judgment from Oyeyoade (2012), and adherence to valuation standards according to Effiong, (2015).

Only four (4) reliable factors are finalised from descriptive analysis, which is the reliability of market data according to Oyeyoade (2012), valuation methodology based on Liman, Amidu, and Levy (2024), valuer's experience from Oyeyoade (2012), and adherence to valuation standards according to Effiong, (2015).

4.3 Objective 2 – Evaluating the Most Significant Factor Affecting the Accuracy of Valuing Petrol Station

The data collected from Section B of the survey questionnaire is about the level of importance for each of the 4 factors given to 30 respondents. The 5-point Likert scale provided in the questionnaire is 1 – Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, and 5 – Strongly Agree. Based on this data, the mean score for each item was determined, and then these factors were ranked according to their scores. However, several factors had the

same mean score, resulting in a tie. To resolve this, the standard deviation score for each factor was considered to adjust these rankings, as depicted in **Table 10**

Table 10: Ranking of the Most Significant Factors Affecting Petrol StationValuation Source: Researcher (2025)

Code	Factor	Mean Score	Ranking	Standard Deviation	New Ranking
F4	**Valuation Method**	**4.19**	**1**	**0.362**	**1**
F6	Valuer's Experience	4.19	1	0.453	2
F7	Adherence to valuation Standard	4.14	2	0.416	3
F1	Reliability of Market Data	3.25	3	0.382	4

Table 10 shows that most of the mean scores for the factors influencing service charges range from 3.25 to 4.19. This means that all factors are considered in evaluating the most significant factor affecting the accuracy of petrol station valuation. Referring to the Likert scale used in the actual survey questionnaire, a scale value of ≥ 3 is considered very good. Each ranking of the factors is arranged according to the standard deviation ranking to determine the latest "rank." However, there are several factors with the same mean score, resulting in a tie. Therefore, the standard deviation score for each factor will be considered to adjust these rankings. Each item of the factors is arranged and re-ranked according to the standard deviation to determine the highest ranking. After the factors have been ranked, the highestranking factor items according to the mean score and standard deviation are the Valuation Method (4.19 and 0.362), Valuer's Experience (4.19 and 0.453), and Adherence to Valuation Standard (4.14 and 0.416). Using inappropriate methods for the property type can reduce accuracy (Liman, Amidu, and Levy. 2024) implying that the 'Valuation Method' significantly affects the accuracy of the valuation. 'Valuation Method' scored as the most significant factor affecting petrol station valuation accuracy based on the ranking in Table 10.

5 Conclusion

The first objective is to identify the factors affecting the accuracy of valuing petrol stations. The research objective was achieved by identifying seven (7) factors affecting the accuracy of valuing petrol stations in Chapter 2. The pilot research found that the Availability of Market Data, Property Characteristics, and Valuer's Judgement factors showed a Cronbach's Alpha value of < 0.5, meaning that the item needed to be dropped and was irrelevant to the actual survey research. Subsequently, the identified factors are *Valuation Method, Valuer's Experience*, *Adherence to Valuation Standard* and *Reliability of Market Data.*

The research's second objective is to evaluate the most significant factor affecting the accuracy of petrol station valuation. This objective was achieved after the data collected from the survey questionnaire was computed through descriptive analysis by frequency. These factors were listed using the mean score index based on input from respondents regarding the significance level of each factor affecting the accuracy of petrol station valuation. The ranking was determined based on the highest mean after the factors were listed according to the standard deviation order. This proves that the *Valuation Method* is the most significant factor affecting the accuracy of petrol station valuation.

Two limitations were identified in this research; the research focuses only on identifying factors affecting the accuracy of valuation and evaluating the most significant factor affecting the accuracy of petrol stations. Other than that, the targeted respondents for this research only focus on valuers and assistant valuers within the Valuation and Property Services Department (JPPH), Selangor.

Hence, the recommendation for future research to be conducted is not only focused on the petrol station in the Selangor area but also generalised across all states throughout Malaysia to obtain more comprehensive findings related to evaluating the most significant factor affecting the accuracy of petrol station valuation.

The recommendation is to focus on other commercial property types as the researcher only focuses on Petrol Station valuation.

Lastly, the researcher recommends to expand the respondent population. For example, the researcher targeted all private valuers in Selangor, as the researcher only targeted public valuers and assistant valuers from the JPPH across Selangor.

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Conflict of Interest

There is no conflict of interests regarding the publication of the paper

Authors' contribution

The authors confirm their contribution to the paper as follows: ***study conception and design***: Muhamad Khairul Amin Mohd Khairulanis, Rozilah Kasim; *data collection*: Muhamad Khairul Amin Mohd Khairulanis; ***analysis and interpretation of results***: Muhamad Khairul Amin Mohd Khairulanis; ***draft manuscript preparation***: Muhamad Khairul Amin Mohd Khairulanis, Rozilah Kasim. All authors reviewed the results and approved the final version of the manuscript.

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