RESEARCH IN MANAGEMENT OF TECHNOLOGY AND BUSINESS
e-ISSN: 2773-5044

RMTB

Vol. 6 No. 1 (2025) 742-748
https://publisher.uthm.edu.my/periodicals/index.php/rmtb

Valuation Accuracy for Petrol Filling Stations: A Conceptual Framework

Rozilah Kasim[1,2]*, Muhamad Khairul Amin Mohd Khairulanis[1]

[1] *Department of Real Estate Management, Faculty of Technology Management & Business, Universiti Tun Hussein Onn Malaysia, Parit Raja, Johor, 86400 MALAYSIA*

[2] *Centre of Project, Property & Facilities Managemet Services (PRoFMs), Fakulti Pengurusan Teknologi dan Perniagaan, Universiti Tun Hussein Onn Malaysia, Parit Raja, Johor, 86400 MALAYSIA*

*Corresponding Author: rozilah@uthm.edu.my
DOI: https://doi.org/10.30880/rmtb.2025.06.01.052

Article Info

Received: 31 March 2025
Accepted: 30 April 2025
Available online: 30 June 2025

Keywords

Conceptual framework, Industry trends, Petrol Filling Stations, Valuation accuracy

Abstract

This paper focuses on the valuation of petrol filling stations, presenting a comprehensive framework that integrates diverse valuation approaches such as the income, cost, and sales comparison methods. The framework emphasizes key factors, including operational efficiency, locational attributes, and market dynamic, aligning with evolving industry trends such as the incorporation of electric vehicle charging infrastructure. The primary objectives are to enhance valuation accuracy and provide actionable insights for both researchers and industry practitioners. While the framework offers significant theoretical advancements by addressing limitations inherent in traditional models, such as their neglect of intangible factors, it remains theoretical and requires empirical validation. The findings hold substantial implications for researchers aiming to refine valuation methodologies and for practitioners seeking to adapt to dynamic market conditions. This paper contributes to the advancement of valuation practices, fostering consistency and sustainability in both academic and professional contexts.

1. Introduction

Valuation accuracy is a cornerstone of effective decision-making within the domains of real estate, business valuation, and investment. Petrol filling stations represent a unique asset class that integrates operational, environmental, and locational complexities, which necessitates precise valuation to inform financial and strategic decisions. Accurate valuations guide owners, investors, and stakeholders in determining fair market value, assessing profitability, and planning for long-term sustainability. Moreover, such precision is critical for regulatory compliance, financing, and tax assessment purposes (Brown & Smith, 2022).

In real estate, valuation accuracy influences market transparency and facilitates efficient resource allocation. For petrol filling stations, which combine real estate and operational businesses, factors such as land use, traffic patterns, and competitive dynamics further complicate valuations (Jones et al., 2020). From a business valuation perspective, the accuracy of appraising revenue streams, spanning fuel sales, non-fuel services, and ancillary operations directly impacts investment attractiveness and viability. Similarly, accurate valuations enhance investor confidence by reducing the uncertainties associated with market fluctuations and operational variances.

Despite its critical importance, existing research on valuation accuracy for petrol filling stations remains limited. Prior studies have primarily focused on traditional valuation approaches, such as the income, cost, and

Research in Management of Technology and Business Vol. 6 No. 1 (2025) p.742-748

market-based methods. However, these models often overlook industry-specific challenges, including environmental regulations, technological advancements, and alternative energy trends (Green, 2019). Furthermore, the heterogeneity of petrol filling stations across geographic and regulatory contexts introduces additional challenges, necessitating a tailored conceptual framework.

This paper seeks to address the identified gaps by proposing a comprehensive conceptual framework for valuing petrol filling stations. Specifically, the framework will incorporate key variables such as locational attributes, revenue diversification, and compliance costs to enhance valuation accuracy. Therefore, the paper aims to address the following questions; i) What are the key drivers of valuation and ii) how do existing valuation approaches handle industry-specific challenges? Through these questions, the research intends to bridge theoretical and practical gaps, offering a robust model for improving valuation practices. This framework can serve as a foundation for future empirical validation and application across different markets and contexts.

2. Literature Review

2.1 Overview of Valuation Accuracy and Methodology

Valuation accuracy for petrol filling stations heavily relies on the methodology employed. Existing valuation models, namely the income approach, cost approach, and market approach offer distinct frameworks, each with inherent strengths and limitations.

Table 1. *Overview of the Existing Valuation Approaches*

Approaches	Advantages	Challenges
Income Approach - evaluates a petrol filling station based on its ability to generate revenue. - applies capitalization rates to net operating income (NOI) or employs discounted cash flow (DCF) models to estimate the present value of future earnings	- This approach considers the profitability of auxiliary operations, such as convenience stores and car washes, making it particularly relevant for stations with diversified revenue streams (Brown & Smith, 2022).	- Accurate financial forecasting is essential but can be hindered by market volatility, fluctuating fuel prices, and operational risks. - Additionally, it may overlook non-monetary attributes like strategic location and brand equity (Jones et al., 2020).
Cost Approach - determines value by summing the land value and the replacement cost of station structures, minus depreciation. - is based on the principle that a rational investor would not pay more for an asset than the cost to recreate it	- This approach provides a straightforward and tangible valuation basis, especially for newly constructed or upgraded facilities (Green, 2019).	- It tends to neglect income potential and market dynamics, making it less suitable for older stations or those with significant non-fuel revenues. - Furthermore, estimating depreciation and obsolescence can introduce inaccuracies
Market Approach - derives value by comparing the petrol filling station to recently sold similar assets, adjusting for differences in location, size, and operational metrics. - This is often seen as the most straightforward method in active real estate markets.	- It captures real-time market trends and reflects buyer and seller behavior, offering a realistic and transparent basis for valuation (Brown & Smith, 2022).	- The availability of comparable sales data is often limited due to the unique nature of each station. - Additionally, this approach may fail to account for intangible factors, such as customer loyalty or competitive positioning (Jones et al., 2020).

Table 1 overviews of the existing valuation approach applicable to the practitioners. While each model presents valuable perspectives, their effectiveness largely depends on the specific context and the integration of supplementary data. A hybrid approach that combines elements of these methods could enhance valuation accuracy by addressing their individual limitations.

2.2 Industry-Specific Factors Affecting Valuation

The valuation of petrol filling stations is uniquely influenced by a range of industry-specific factors, including environmental compliance and revenue variability. These factors introduce complexities that often require tailored valuation methodologies to achieve precision

2.2.1 Environmental Compliance

Environmental regulations have a profound impact on the valuation process, given the operational and locational constraints they impose. Petrol filling stations must adhere to stringent standards regarding fuel storage, emissions, and waste management. Compliance costs, such as the installation of underground storage tanks or vapor recovery systems, can significantly affect the financial outlook of these assets (Brown & Smith, 2022). Additionally, potential liabilities arising from soil contamination or regulatory non-compliance can reduce a station's market value. Studies emphasize that overlooking these factors in traditional valuation approaches leads to underestimated costs and, consequently, inaccurate valuations (Jones et al., 2020).

2.2.2 Revenue Variability

Revenue streams for petrol filling stations are increasingly diversified, spanning fuel sales, non-fuel services (e.g., convenience stores, car washes), and ancillary income from advertising or leasing spaces. However, these streams are subject to variability due to market dynamics, consumer behaviour, and economic fluctuations. Green (2019) highlights that revenue from non-fuel services can contribute significantly to overall profitability, yet traditional valuation models often fail to adequately integrate these components. The rise of alternative energy vehicles further introduces uncertainty into long-term revenue projections, necessitating the adoption of flexible and dynamic valuation frameworks.

Therefore, environmental compliance and revenue variability are critical determinants of petrol filling station valuation. Incorporating these factors into a comprehensive framework will enhance the accuracy and reliability of valuations, addressing the complexities inherent in this asset class.

Although environmental compliance and revenue variability factors are widely recognized, existing studies often treat them in isolation, neglecting their combined impact on valuation outcomes. Furthermore, there is limited research on how emerging trends, such as the adoption of electric vehicle charging stations, influence valuation practices. Addressing these gaps requires a holistic approach that integrates industry-specific considerations into existing valuation methodologies

2.3 Industry Trends Affecting Valuation: The Rise of Alternative Fuel Stations

The valuation of petrol filling stations is increasingly influenced by emerging industry trends, particularly the growing prominence of alternative fuel stations. As global efforts to transition towards sustainable energy intensify, the traditional business model of petrol filling stations is undergoing significant transformation.

2.3.1 Shift Towards Electric Vehicle (EV) Charging Infrastructure

Environmental regulations have a profound impact on the valuation process, given the operational and locational constraints they impose. Petrol filling stations must adhere to stringent standards regarding fuel storage, emissions, and waste management. Compliance costs, such as the installation of underground storage tanks or vapor recovery systems, can significantly affect the financial outlook of these assets (Brown & Smith, 2022). Additionally, potential liabilities arising from soil contamination or regulatory non-compliance can reduce a station's market value. Studies emphasize that overlooking these factors in traditional valuation approaches leads to underestimated costs and, consequently, inaccurate valuations (Jones et al., 2020).

2.3.2 Emerging of Hydrogen and Biofuel Stations

Hydrogen and biofuels are gaining traction as alternative energy sources, particularly in regions with supportive government policies and incentives. Stations equipped to offer these fuels may experience an increase in valuation due to their alignment with future energy trends. However, the high costs associated with retrofitting existing infrastructure and the limited consumer base for these fuels pose challenges to widespread adoption (Jones et al., 2020).

2.3.3 Consumer Preferences and Regulatory Pressures

Changing consumer preferences towards environmentally friendly options and stricter environmental regulations are reshaping the operational landscape of petrol filling stations. Stations that fail to adapt to these trends may face declining revenues and reduced valuations. Conversely, those that proactively embrace sustainable practices, such as offering renewable energy options or implementing carbon offset programs, are likely to see enhanced market appeal and valuation (Green, 2019).

3. Proposed Conceptual Framework

Accurate valuation of petrol filling stations requires a comprehensive understanding of interconnected factors that influence outcomes. This section proposes a theoretical framework for analyzing valuation accuracy by identifying critical determinants such as market dynamics, operational efficiency, and location, and describing their relationships with valuation outcomes.

3.1 Key Factors Influencing Valuation Accuracy

3.1.1 Market Dynamics

Economic conditions, fuel price volatility, and competition are significant variables impacting valuation accuracy. Variability in demand for fuel and non-fuel services directly influences revenue forecasts and market perceptions, which are core components of valuation models (Brown & Smith, 2022).

3.1.2 Operational Efficiency

The ability of a petrol filling station to maximize revenue while minimizing operational costs is a critical determinant. Factors such as supply chain management, staff productivity, and energy efficiency play pivotal roles in determining profitability and, consequently, valuation (Jones et al., 2020).

3.1.3 Location

The geographic and strategic positioning of a petrol filling station significantly affects its value. Proximity to high-traffic areas, accessibility, and demographic factors like income levels and vehicle ownership contribute to differences in valuation outcomes across locations (Green, 2019).

3.2 Relationships Between Factors and Valuation Outcomes

The relationships between various factors play a critical role in shaping the accuracy of valuation outcomes. Market dynamics, for instance, influence operational efficiency by dictating pricing strategies and cost management practices.

Similarly, location determines the accessibility of a petrol filling station to its market and customer base, impacting revenue generation and competitive positioning. The integration of these variables into valuation methodologies allows for a more comprehensive and precise analysis.

Positive interactions between market conditions and operational efficiency can enhance profitability, thereby contributing to greater valuation accuracy. Conversely, the benefits of strong operational performance may be diminished by an unfavorable location, which limits customer access and reduces revenue potential.
These interactions highlight the necessity of adopting a holistic approach to valuation that accounts for the interplay between economic, operational, and locational factors

3.3 Existing Theories and Evidence

The proposed framework for valuing petrol filling stations draws on established valuation theories and empirical findings to enhance its theoretical foundation.

3.3.1 Income Approach Theory

The income approach theory emphasizes revenue generation as a core determinant of value. This aligns closely with critical factors such as market dynamics and operational efficiency. By estimating future earnings through methods like discounted cash flow (DCF) or capitalization rates, this theory provides a strong basis for assessing profitability, particularly for stations with diversified revenue streams (Brown & Smith, 2022). However, challenges such as market volatility and operational risks can complicate its application, necessitating complementary methodologies.

3.3.2 Location Theory

Location theory highlights the importance of geographic factors in determining market viability and accessibility. It argues that proximity to high-traffic areas and demographic relevance are essential for maintaining customer access and enhancing revenue potential (Green, 2019). This theory is particularly valuable for integrating locational attributes into valuation practices, ensuring that both tangible and intangible factors are considered.

3.3.3 Multifactorial Influences and Empirical Findings

Recent studies underscore the need to incorporate multifactorial influences to improve valuation precision. For example, Jones et al. (2020) emphasize the interconnectedness of variables such as market conditions, operational efficiency, and compliance costs. These findings suggest that holistic frameworks, which account for the interaction between economic and locational dynamics, can significantly enhance valuation accuracy.

These theories and empirical evidence form the basis of the proposed framework, providing a comprehensive understanding of the key factors affecting valuation outcomes. By building on these established foundations, the framework aims to address gaps in traditional valuation methodologies while aligning with contemporary industry demands.

3.4 The Conceptual Framework Development

This valuation framework underscores the interconnectedness of market dynamics, operational efficiency, and location in determining valuation accuracy for petrol filling stations. By integrating these factors, the framework provides a robust basis for improving valuation methodologies and addressing industry-specific complexities

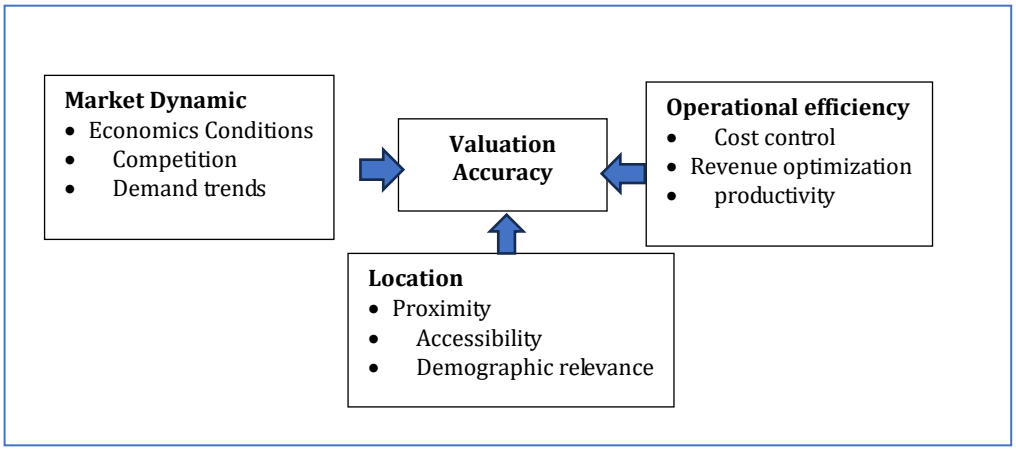

Figure 1: *Conceptual framework of Valuation Accuracy for Petrol Filling Stations*

4. Discussion

4.1 Strengths and Limitations of the Proposed Framework

The conceptual framework for valuing petrol filling stations demonstrates several notable strengths. By integrating key determinants such as market dynamics, operational efficiency, and locational attributes, the framework addresses the intricate complexities associated with this asset class. Its focus on revenue diversification and compliance costs offers an enhanced level of valuation accuracy, effectively overcoming certain limitations found in traditional models like the cost and market approaches (Brown & Smith, 2022; Jones et al., 2020). Additionally, the framework's emphasis on interconnected factors contributes to a more holistic and nuanced approach, potentially elevating current valuation practices.

Nevertheless, the framework is not without its limitations. Despite its acknowledgment of industry-specific challenges, it remains largely theoretical, lacking the empirical validation necessary for practical implementation. Established valuation methodologies, such as the income and cost approaches, offer proven reliability within specific contexts, whereas the proposed framework requires further empirical testing to verify its accuracy and adaptability across diverse markets and regulatory landscapes (Green, 2019). These limitations underscore the broader challenges identified in prior studies, where theoretical models often face obstacles in transitioning to practical applications (Jones et al., 2020).

In summary, the framework's ability to integrate diverse factors such as locational attributes, compliance costs, and revenue diversification marks a significant advancement over traditional valuation approaches, which frequently neglect these dimensions (Brown & Smith, 2022). However, its theoretical nature highlights the need for further validation to ensure its applicability across varying contexts.

4.2 Novel Contributions as Compare to the Existing Models or Approaches

The proposed framework differentiates itself from conventional valuation methodologies by integrating intangible factors, such as compliance costs and strategic locational attributes. This innovative approach aligns with evolving industry trends, including the incorporation of electric vehicle charging infrastructure, which are

often overlooked in traditional models. By adopting a hybrid nature, the framework bridges critical gaps inherent in standalone methods, such as the income approach's dependence on financial projections and the cost approach's limited consideration of market dynamics (Brown & Smith, 2022).

Despite its advancements, the proposed framework faces notable challenges, particularly in acquiring the comprehensive and multifactorial data necessary for its application. In contrast, traditional valuation models maintain advantages in their simplicity and direct applicability. For example, the market approach effectively captures real-time buyer behavior, making it particularly valuable in active real estate markets (Jones et al., 2020). Similarly, the cost approach offers practical methodologies for valuing newly constructed facilities, further emphasizing the utility of established practices in specific contexts (Green, 2019).

Nonetheless, traditional models often fail to address intangible elements, such as customer loyalty and environmental compliance. The proposed framework, with its novel incorporation of locational and operational dynamics, represents a significant improvement in addressing these considerations. Furthermore, its alignment with emerging trends, such as the adoption of electric vehicle infrastructure, underscores its relevance in contemporary valuation practices (Margolius, 2012; Aher, 2022).

4.3 Potential Applications in Practice and Policy

The proposed framework holds substantial promise for application in both practice and policy. For practitioners, it provides a systematic approach to improving valuation accuracy, particularly in markets subject to uncertainties such as fluctuating fuel prices and the transition to alternative energy sources. Its adaptability to revenue diversification further enhances its utility in addressing dynamic market conditions (Green, 2019). For policymakers, the framework offers an opportunity to standardize valuation practices, fostering consistency across diverse geographic and regulatory contexts. Moreover, its emphasis on environmental compliance and sustainability aligns with international policy efforts aimed at mitigating carbon footprints and promoting greener practices in petrol station operations (Brown & Smith, 2022).

However, practical implementation of the framework may demand significant resources, including robust data collection and advanced technological tools for dynamic modeling. Its theoretical foundation also highlights the necessity for collaboration among researchers and industry stakeholders to refine its components and establish empirical validation prior to widespread adoption. Bridging the gap between theoretical constructs and real-world application remains a critical challenge requiring active engagement from all relevant sectors (Hunter, 1992).

In summary, the framework's focus on environmental compliance, sustainability, and revenue diversification underscores its relevance to both practitioners and policymakers. By integrating these features into standardized valuation practices, it represents a significant step toward advancing industry practices and adapting to evolving market demands

5. Conclusion

The paper makes significant theoretical contributions by introducing a framework for valuing petrol filling stations that integrates diverse approaches such as the income, cost, and sales comparison methods. This framework incorporates intangible factors like compliance costs and location-based attributes, aligning with evolving industry trends. Additionally, it emphasizes the need for addressing market dynamics and sustainability considerations in valuation practices, offering practical relevance for policymakers and industry stakeholders.

Despite its strengths, the framework remains theoretical, requiring empirical validation to establish its reliability and adaptability across diverse markets. Future research should focus on refining the framework, collecting comprehensive data, and exploring its practical applications in real-world scenarios. Furthermore, investigating the relationship between valuation methods and financial outcomes could enhance the framework's relevance and utility for decision-making in the energy sector.

Acknowledgement

The authors would like to thanks the Department of Real Estate Management and the Faculty of Technology for supporting this paper for publication.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper

Authors Contribution

The authors confirm contribution to the paper as follows: ***study conception and design :*** *Rozilah Kasim and Muhamad Khairul Amin Mohd Khairulanis;* ***data collection:*** *Khairul Amin Mohd Khairulanis;* ***analysis and***

***interpretation of results**: Rozilah Kasim and Muhamad Khairul Amin Mohd Khairulanis.; **draft manuscript preparation:** Rozilah Kasim and Muhamad Khairul Amin Mohd Khairulanis. All authors reviewed the results and approved the final version of the manuscript*

References

Brown, P., & Smith, J. (2022). Valuation Practices in Energy Retail. Journal of Real Estate Studies, 45(3), 123-145.

Jones, R., Taylor, M., & Lee, H. (2020). Valuation Accuracy in Urban Settings: A Case Study of Petrol Stations. *Property Economics Review*, 12(4), 89-102.

Green, A. (2019). Advances in Real Estate Valuation Methodologies. Journal of Property Research, 34(2), 78-96.

Hunter, D.R. (1992). The Valuation of Petrol Filling Stations. *Journal of Property Valuation and Investment*, 10 (1), 438-442

Aher, P.D. (2022). To Study the Valuation of Gas filling Station. *International Joral of Research and Analytical Reviews*, 9(3), 263-265