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Perceived Accuracy of Modern Technologies in Property Valuation: Evidence From South Africa

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ABSTRACT

Property valuation accuracy remains a persistent concern within the real estate industry, particularly in developing markets where valuation inconsistencies undermine market confidence and professional credibility. Although Artificial Intelligence (AI), Geographical Information Systems (GIS), Automated Valuation Models (AVMs) and machine learning are increasingly associated with enhanced valuation accuracy and analytical capability, professional confidence in these technologies remains underexplored. This study investigates property valuers' perceptions of modern technologies' ability to improve valuation accuracy within the South African property valuation profession and examines whether these perceptions differ across demographic and professional groups. A quantitative survey design was adopted using a structured Likert-scale questionnaire distributed to registered property valuers in South Africa, yielding 340 valid responses. Descriptive and inferential statistical analyses, including Spearman's correlation analysis, Kruskal-Wallis H tests and pairwise Mann-Whitney U tests, were conducted. The findings reveal a pronounced divergence in perceptions across technologies. GIS was consistently perceived as a trusted and established valuation support tool, whereas perceptions regarding AI remained divided and varied significantly across registration class, experience groups and valuation specialisations. Less experienced valuers and candidate valuers demonstrated significantly greater confidence in AI technologies than their experienced, professional, registered counterparts, suggesting a generational divide in technology acceptance within the profession. Integrated technological approaches combining AI, GIS, AVMs and satellite imagery were perceived more positively than standalone technologies. The study identifies a critical contradiction between the demonstrated technical capabilities of AI-driven valuation systems and the ongoing professional hesitation toward their adoption. The findings suggest that trust, transparency, and explainability may be central determinants of technological adoption within professional valuation practice.

Keywords: Artificial intelligence (AI), Geographical information systems (GIS), Modern technology, South Africa, Valuation accuracy

INTRODUCTION

The accuracy of property valuations is a concern globally and even more so in developing countries like South Africa (Deppner, von Ahlefeldt-Dehn, Beracha & Schaefers, 2023; Malkowska & Uhruska, 2022; Reinert, 2021; Effiong & Mendi, 2019; and Buuveibaatar, Lee & Lee, 2023). The valuation industry

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is challenged by inaccuracies and variances, which damage the profession's image in general. The accuracy of property valuations is influenced by several factors, including the expertise of the valuer, the behavioural factors of the valuer and external factors.

Incorporating modern technology into property valuations may increase their accuracy. Traditional property valuations are subject to numerous challenges such as subjectivity, the use of heuristics and the behaviour of property valuers. The use of modern technology such as AI, AVM's and other predictive technologies largely negate these challenges, as the subjectivity and behaviour of the valuer are minimised. Modern technologies such as AI, AVM's and other predictive technologies have dramatically evolved in recent years; however, the confidence in the accuracy of these modern technologies remains under-explored. The objective of this study is to investigate whether property valuers perceive modern technologies as improving the accuracy of property valuations, and whether these perceptions vary across professional registration categories, experience groups, education groups, valuation specialities, and geographical locations.

Benefits of Modern Technology in Property Valuation

The efficiency, objectivity, and analytical capabilities of property valuation have notably been enhanced through the integration of modern technologies such as AI, Machine Learning (ML), Geographical Information Systems (GIS), and Building Information Modelling (BIM). In a research endeavour in Belgium and Morocco, El Yamani, Hajji, and Billen (2023) aimed to improve valuation accuracy in urban and city contexts using Building Information Modelling (BIM) and City Information Modelling (CIM). The study found that indoor variables, such as building material choices regarding maintenance and quality, indoor daylight or natural lighting, and solar potential, integrated with outdoor environmental information, improved property value estimation. Similarly, Droj, Kwartnik-Pruc, and Droj (2024) found that GIS provides practical tools and solutions for mass valuations and automated valuation models (AVMs) and concluded that integrating satellite imagery, AI or machine learning and GIS can improve the accuracy and objectivity of property valuations. An article by Jafary et al. (2022) further argues that BIM can be integrated into artificial intelligence (AI) and machine learning (ML) based valuation methods to improve valuation accuracy. The author suggests that integrating BIM with AI and ML into automated valuation models may offer more efficient, data-driven and ultimately more accurate valuation outcomes, as BIM produces more precise three-dimensional (3D) visual property data that can be used in valuation models. Some empirical studies also illustrate the benefits of AI and ML. Abidoye, Ma, and Lee (2021) state that AI's main advantages are reduced costs of mass valuations, greater valuation process efficiency, and improved valuer objectivity. Faheemuddin (2025) reviewed 15 peer-reviewed studies and concluded that AI and ML are superior to traditional methods, offering better predictive power, greater adaptability through continuous algorithm adaptation, and stronger analytical capabilities for nonlinear datasets. Furthermore, it can handle complex data, reduce valuation errors and achieve exceptional results in detecting transactional fraud.

Impact of Modern Technology on Valuation Accuracy

Improving valuation accuracy is a focus area in the literature, with several studies providing strong evidence that AI- and ML-based valuation models surpass traditional valuation methods. Zaki et al. (2022) developed a machine learning algorithm using Extreme Gradient Boosting (XGBoost) to assess its accuracy relative to the Hedonic pricing model. The study found that XGBoost predicted estimated property values more accurately, with approximately 84.10% accuracy, compared to the hedonic pricing model, which achieved 42%. Deng & Zhang (2025) similarly established in a study in Hong Kong, that AI and ML models surpass traditional valuation models, especially when extracting data from a large dataset and determining non-linear relationships linking property value and its characteristics. Furthermore, it was concluded that traditional valuation models are subjective and based on human experience, whereas AI/ML models use objective data. A recent study in Greece by Karanikolas, Kyriakidou, and Athanasouli (2025) aimed to develop and test a multimodal AI valuation framework to improve the accuracy and comprehensiveness of property valuations. Findings revealed that traditional valuation methods produce higher errors and greater variation, and integrating polymorphic attributes significantly increased the accuracy, consistency, and transparency of automated valuation models. The study exemplifies that multimodal AI models perform better than traditional valuation methods specifically referring to their accuracy and reliability. Furthermore, the study concluded that traditional and hedonic methods can be complemented by AI-enhanced models, particularly when information is incomplete, thereby providing better documentation and alignment with international valuation standards (IVS). Maselli & Nestico (2025) studied three machine learning models in Italy and similarly confirmed that ML models are better at handling complex and non-linear property data when compared to traditional valuation methods. The study found that the Random Forest model achieved the best balance between accuracy and transparency, supporting the claim that ML models offer superior performance to traditional methods and are promising for predictive tools.

Nevertheless, a pronounced contradiction exists within the literature. Although modern technologies demonstrate improved efficiency and valuation accuracy, property valuers continue to perceive them as unreliable. This underscores the importance of creating transparency and trust in modern technology.

Research Gap

Although the literature agrees that modern technology is critical to improving property valuation accuracy, empirical evidence from the South African context is limited. A recent study by Du Toit & Amoah (2026) revealed that modern technology adoption in South Africa is very limited with property valuers relying more on supporting technologies such as geographical information systems, satellite imagery and valuation dashboard than predictive technologies such as Artificial Intelligence (AI), automated valuation models (AVMs) and LiDAR. Although low levels of adoption were confirmed by the study, the confidence of property valuers in modern technology's ability to enhance the accuracy of property valuations remains untested. This confirms a critical gap in the literature, especially given the contradiction between AI models and property valuers' reluctance to adopt modern technology. Therefore, this study aims to investigate whether property valuers perceive modern technologies as improving the accuracy of property valuations, and whether these perceptions vary across professional registration categories, experience groups, education groups, valuation specialities, and geographical locations.

METHODOLOGY

The study was designed as a robust quantitative survey, consistent with inductive pragmatic ontological philosophy. Data collection was conducted using a national survey questionnaire with a five (5) point Likert scale and included only registered property valuers in South Africa. The total population of valuers registered at the South African Council for the Valuers Profession (SACPVP) is 2452 and therefore a valid sample (n) was calculated using the formula $s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$ to be 332 respondents at a 95% confidence level (Krejcie & Morgan, 1970). A total of 340 valid responses by a diverse respondent sample was achieved, meeting and exceeding the required threshold. The survey was disseminated via e-mail and other electronic devices to all registered property valuers in South Africa. Google Forms was used to capture respondent responses, and Excel and SPSS version 30 were used to analyse the data. Ethical clearance for the study was granted by the University of the Free State, and all participants provided consent to participate in the survey. All respondents remained anonymised, and data were coded in line with the Protection of Personal Information Act 4 of 2013.

Data analysis included descriptive statistics to assess agreement that each technology improves valuation accuracy, followed by inferential statistics such as Spearman's correlation analysis to determine relationships between the technologies, the Kruskal-Wallis H test to determine whether perceptions vary across demographic variables, and finally the Pairwise Mann-Whitney U test to determine which groups differ significantly.

RESULTS

This section aimed to reveal the perception of property valuers regarding the ability of modern technologies to improve valuation accuracy within the South African valuation industry. Additionally, test if the results vary significantly between provinces, experience, valuer specialisation and qualifications. The results are organised into five sections: (1) respondent demographics, (2) descriptive statistics describing the adoption of technology, (3) analysis of relationships between the technology, (4) differences across provinces, specialisations, qualifications, experience and registration class and (5) interpretation of the results.

Demographic Information

A total of 340 valid responses were achieved, representing a diverse sample of property valuers across all nine provinces of South Africa. Geographical representation was concentrated around the urban areas of South Africa where the majority of valuation practises are located, with the Western Cape representing 35.6%, Gauteng 34.7% and smaller proportions from the more rural areas like the Eastern Cape (6.2%), Kwazulu-Natal (5.9%), Mpumalanga (5.0%), North West (4.4%), Free State (3.5%), Northern Cape (2.6%) and Limpopo (2.1%).

The sample included valuers from all three registration classes: 52.9% registered as Professional Valuers, 32.4% as Professional Associated Valuers, and 14.7% as Candidate Valuers. In terms of qualifications, 44.7% of respondents held a National Diploma, 17.6% a Bachelor's degree, 22.4% an Honours degree, 14.4% a Master's degree and less than 1% Doctoral degree. Experience-wise, a large proportion (37.6%) of the respondents had over 21 years' experience, 21.8% with 15 to 20 years, 15.0% with 6-10 years, 13.5% with 0-5 years and 12.1% with 11 to 15 years. Valuers specialising in commercial valuations dominated the sample at 37.4%, followed by municipal valuations at 25.6%, residential valuations at 21.8%, and agricultural valuations at 15.3%.

Perceived Accuracy of Modern Technology

To assess whether modern technology can increase the accuracy of property valuations, respondents were asked to indicate their perceptions of the different technologies listed in Table 1 below.

The results indicate clear differences between the categories. Perceptions regarding the ability of AI technologies to improve valuation accuracy were clearly divided, with 42.65% in agreement, versus 32.65% of respondents with neutral responses, and a large proportion of 24.71% indicating their disagreement with the ability of AI technologies to improve the accuracy of property valuations. In contrast, GIS technology was perceived as the tool with the greatest ability to improve valuation accuracy, with near-consensus agreement at 92.35%. Interestingly, when the different technologies like AI, GIS, AVM's and Satellite imagery are combined, respondents perceived the combination of technologies to have the ability to improve valuation accuracy, with 72.06% agreement.

Table 1: Descriptive statistics of perceived accuracy of valuation technologies.

Technology	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean Score
Artificial Intelligence (AI)	8.24	16.47	32.65	34.12	8.53	3.18
Geographic Information Systems (GIS)	1.18	2.06	4.41	60.00	32.35	4.20
Combined Technologies	1.76	9.41	16.76	55.59	16.47	3.76

Spearman's Correlation Analysis: Relationships Between Perceptions of Modern Technology Accuracy

To test the relationship between perceptions of technology accuracy, Spearman's correlation analysis was used, and the results are presented in Table 2. The analysis uncovered a weak positive association between perceptions of AI and GIS accuracy; this may suggest that respondents who perceived AI to improve the accuracy of valuations also perceived GIS to improve the accuracy of valuations.

Furthermore, perceptions of combined technologies showed a moderate positive association with both AI and GIS, suggesting that respondents perceive integrated technologies differently from individual technologies in isolation, and indicate higher confidence in combined technologies.

Table 2: Spearman rank correlation matrix for perceived accuracy variables.

Variable	AI Accuracy	GIS Accuracy	Combined Technologies
AI Accuracy	1.000	0.212***	0.435***
GIS Accuracy	0.212***	1.000	0.485***
Combined Technologies	0.435***	0.485***	1.000

Combined tech – AI, GIS, AVM's and Satellite imagery

Note: ***$p < 0.001$

Differences Between Demographic Groups

To ascertain whether perceptions regarding modern technology's ability to improve valuation accuracy across the demographic groups vary, a series of Kruskal-Wallis H tests were conducted. Variables tested included registration class, experience, valuation specialisation, qualification, and geographical location. The results of the Kruskal-Wallis H tests are summarised in Table 3.

AI's ability to improve valuation accuracy produced a statistically significant difference across registration classes, despite GIS and combined technologies producing no significant differences. Furthermore, it was observed that AI's ability to improve valuation accuracy varied significantly across the experience groups. Similar to the registration class, GIS and the combined technologies did not produce any statistically significant variations across experience groups. As far as valuation specialisation is concerned, both AI and GIS demonstrated statistically significant differences, whereas the combined technologies showed no statistically significant differences. When qualifications were considered for AI, GIS and combined technologies, no statistically significant differences were observed across qualification groups. The same was true for provincial variables, indicating that all the technologies are perceived consistently across the nine provinces of South Africa.

Table 3: Kruskal–Wallis H test results for differences in perceived accuracy.

Variable	Test	AI	GIS	Combined Technologies
Registration Class	Kruskal–Wallis H	H = 12.52, p = 0.0019	H = 1.23, p = 0.542	H = 4.37, p = 0.112
Experience	Kruskal–Wallis H	H = 11.53, p = 0.021	H = 4.52, p = 0.341	H = 2.46, p = 0.651
Specialisation	Kruskal–Wallis H	H = 8.33, p = 0.0396	H = 12.23, p = 0.0066	H = 6.35, p = 0.096
Qualification	Kruskal–Wallis H	H = 4.37, p = 0.359	H = 2.99, p = 0.559	H = 5.21, p = 0.266
Province	Kruskal–Wallis H	H = 9.86, p = 0.275	H = 13.33, p = 0.101	H = 6.69, p = 0.570

Significance determined at $p < 0.05$; pairwise comparisons adjusted using the Bonferroni method.

Due to statistically significant differences between registration classes, experience levels, and valuation speciality, a series of non-parametric Mann-Whitney U Tests was conducted to identify which pairs of groups differ. Bonferroni adjustments were applied to mitigate Type I error inflation from multiple comparisons, with an adjustment of 0.05. Only the statistically significant comparison was reported and is summarised in Table 4.

The tests revealed that Candidate valuers reported significantly higher confidence in AI's ability to improve valuation accuracy than Professional valuers, despite a small to moderate effect size ($U = 5881.0$, $p = 0.00057$, $r = 0.22$). Analogously, valuers with 0-5 years' experience demonstrated significantly greater confidence in AI's ability to improve valuation accuracy compared to valuers with more than 20 years' experience ($U = 3819.0$, $p = 0.00182$, $r = 0.23$). As far as valuation speciality is concerned, valuers specialising in Agricultural valuations reported significantly higher confidence in AI's ability to improve valuation accuracy compared to valuers specialising in municipal valuations ($U = 1648.5$, $p = 0.00539$, $r = 0.23$). For GIS technology, significantly higher confidence in valuers specialising in Agricultural valuations was recorded compared to their counterparts specialising in Residential valuations ($U = 2475.0$, $p = 0.00213$, $r = 0.24$).

Table 4: Significant pairwise comparisons of perceived accuracy (Mann–Whitney U tests).

Comparison	Variable	Group 1 Mean	Group 2 Mean	U Statistic	p-Value	Effect Size (r)
Candidate vs Professional Valuers	AI	3.66	3.04	5881.0	0.00057	0.22
0–5 years vs >21 years	AI	3.57	3.02	3819.0	0.00182	0.23
Agricultural vs Municipal	AI	3.40	2.90	1648.5	0.00539	0.23
Agricultural vs Residential	GIS	4.42	3.99	2475.0	0.00213	0.24

Note: Significance determined at $p < 0.05$; pairwise comparisons adjusted using the Bonferroni method. Only statistically significant pairwise comparisons after Bonferroni adjustment are reported.

DISCUSSION

The findings of this study reveal that perceptions of modern technology's ability to improve valuation accuracy are not uniform within the South African property valuation industry. Respondents' perceptions of AI varied significantly across registration class, experience groups and valuation speciality, suggesting that valuers feel uncertain about AI and AI's emerging role in the valuation industry. South African property valuers appear divided on AI's ability to produce accurate valuations. This confirms the hesitation, distrust, scepticism, and low adoption of AI reported in Du Toit & Amoah (2026) and similar studies by Gbadebo & Adewusi (2025), Adejumo et al. (2024), Abidoye, Ma & Lee (2021) and Mugunthany & Muhammad (2008), supporting findings. These findings are in contrast with studies by Jafary et al. (2022), Zaki et al. (2022), Ota & Uto (2024), Deng & Zhang (2025), and Karanikolas, Kyriakidou and Athanasouli (2025), which found that AI and ML outperform traditional valuation methods in predictive accuracy and analytical capabilities. Moreover, the findings suggest that less experienced valuers and candidate valuers trust AI more than their experienced counterparts, indicating a clear generational acceptance divide and possibly greater exposure to digital tools.

In contrast with findings on AI, GIS demonstrated consistently high agreement that it may be able to improve valuation accuracy in South Africa, confirming that it is a trusted, established, and familiar technology. Furthermore, combining modern technology such as AI, GIS, AVM's and Satellite imagery were positively viewed and supported, confirming indications from similar studies by El Yamani, Hajji and Billen (2023), Droj, Kwartnik-Puc, and Droj (2024), Jafary et al. (2022), Zaki et al. (2022) and Karanikolas, Kyriakidou and Athanasouli (2025), agreeing that integrated technologies are more trusted than standalone AI. Interestingly, the results suggest that valuers specialising in agricultural valuations trust AI more than valuers specialising in municipal valuations. GIS is similarly trusted significantly more by Agricultural valuers compared to residential valuers. This may reflect the spatially intensive and land-based nature of agricultural valuation practice, where more established technologies such as GIS and satellite imagery are more directly applicable.

CONCLUSION

The study successfully achieved its objectives by establishing the property valuers' perceptions regarding the ability of modern technology to improve valuation accuracy in South Africa. Moreover, the objective of establishing whether the perception of property valuers varies across demographic groups has been satisfied. Findings indicated that perceptions of modern technology varied significantly across technologies and demographic groups. Property valuers confirmed that GIS was perceived as the most trustworthy technology, while perceptions of AI remained divided, with the most variation across registration classes, experience groups and valuation specialities. Conversely, combined and integrated technologies such as AI, GIS, AVM's and Satellite imagery were positively perceived when compared to standalone technologies. This suggests that a hybrid valuation approach incorporating a combination of modern technologies may provide a more acceptable pathway for technology adoption in the valuation industry.

The findings furthermore uncovered a significant paradox between the valuers' profession's perception and modern technological capabilities. Despite various authors concluding that AI and ML-based valuation approaches outperform traditional valuation approaches, property valuers demonstrated consistent hesitation regarding the capabilities of AI. It appears that valuers tend to trust modern technologies that support a valuation outcome rather than technologies that independently predict or generate outcomes. Technological advancement may not be sufficient to drive adoption in the valuation industry. Explainability, transparency, familiarity, and professional trust seem to play essential roles in shaping perceptions of modern technology and driving adoption.

The study recommends that professional bodies like the South African Council of the Property Valuers Profession (SACPVP), South African Institute of Valuers (SAIV), valuation firms and higher education institutions place greater emphasis on the training of modern technologies, focusing on transparency and practical integration to enhance confidence of valuers in modern technologies, ultimately supporting technological advancement in the property valuation industry. Future research should focus on the ethical, behavioural and professional factors influencing trust and acceptance of modern technologies within the property valuation industry.

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