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Investigating Mediation Effect of Innovation on the Relationship Between Project Management and Property Organizational Performance

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Abstract: In the context of challenging property organizational performance, innovation plays a crucial role in mediating the relationship between project management and organizational performance. Therefore, this paper presents a study aiming to develop and assess a mediation model where project management acts as the independent variable, innovation as the mediator, and property organizational performance as the dependent variable. Data were collected through a questionnaire survey among employees in real estate companies in the UAE, distributing 390 questionnaires using traditional random sampling techniques. However, the model utilized responses from 375 completed questionnaires. The collected data were employed to develop the model in SmartPLS software, which was then analysed and assessed at both the measurement and structural components. The findings indicate that all direct relationships are statistically significant, except for one: QTY -> INNO. Concerning indirect relationships, two out of the four relationships are not statistically significant: QTY -> INNO -> PFM and SCP -> INNO -> PFM. Additionally, the mediator variable, INNO, induces two instances of partial mediation and two instances without any mediation effect. Moreover, the model's Goodness-of-Fit value is 0.766, indicating that the model has 76.6% of predictive capability.

Keywords: Project management, property organizational performance

1. Introduction

In the context of the United Arab Emirates (UAE), several challenges and factors have come to light that affect the performance of projects within the region. Among these, inconsistent funding release from clients has been identified as a critical issue, impacting the successful execution of construction projects, as noted by Mushtaq et al. in 2017. Khalid et al. (2018) have also highlighted the significance of performance evaluation, incomplete contract information, and client delays in payments as obstacles hindering project completion. This inconsistency in funding hampers progress at construction sites and places significant pressure on developers, who must continue building within tight budgets, resulting in a substantial impact on their performance in the current economic climate.

Furthermore, the financial landscape in the UAE has undergone changes, with financial institutions adjusting their mortgage lending policies, making it more challenging for individuals to obtain home loans. In response, major stakeholders, including clients, developers, builders, subcontractors, consultants, suppliers, and logistic companies, have resorted to post-dated checks to address the recurrent issue of funding shortages. This, in turn, has led to cost restrictions for developers, which adversely affects their performance. Notably, the recent epidemic has caused a decline in property values, prompting some real estate developers to reduce prices by as much as 50% and offer flexible payment options to attract buyers (Jin et al. in 2017).

Quality limitations also pose a challenge to developer performance, particularly concerning the use of subpar materials in construction due to financial constraints. This leads to project delays, malfunctions, leaks, and other issues at construction sites, further tarnishing the developer's reputation. Technical issues on construction sites are another aspect influencing developer performance, often requiring the intervention of skilled engineers and project management teams to address various engineering concerns. Inadequate employee training is highlighted as a common issue affecting work performance, impacting real estate developers who employ a diverse workforce from around the world. The multicultural work environment often results in conflicts, disputes, and confrontations, all of which negatively influence developer performance. The scarcity of skilled and semi-skilled labour, exacerbated by political situations in the Middle East, further hinders ongoing project completion. Numerous factors, including quality, cost, time schedule, and others, significantly impact developer performance, demanding substantial investments of time, money, and resources to mitigate their effects. In addition, organizational performance in Abu Dhabi, UAE, is found to be affected by factors such as a lack of talented and experienced personnel, financial issues, a lack of enthusiasm, difficulties in work-life balance, and employee personal issues, as observed by Sandybayev in 2019.

Project management strategies are essential for addressing these multifaceted challenges. Different methods and practices have emerged as standard procedures in managing projects, influenced by specific environmental and social considerations. The choice and application of project management practices can vary based on their relevance to a project's success, and some techniques may not typically be associated with project management. Considering these challenges, it becomes evident that the UAE lacks substantial research material in this domain. Nonetheless, international research in related fields sheds light on the importance of organizational performance, emphasizing the role of teamwork, collaboration, and innovation in enhancing productivity and effectiveness. It is noteworthy that innovation often faces barriers, including a lack of collaboration and diversity, which directly impact an organization's performance. This study aims to explore how innovation mediates the relationship between project management and performance in UAE Property Companies, shedding light on the intricate dynamics of this critical interaction within the context of the UAE's unique real estate landscape.

2. Literature Review

2.1 Property Management Industry in UAE

The property management industry in the United Arab Emirates (UAE) has experienced remarkable growth and transformation over the past few decades. This sector plays a vital role in the UAE's thriving real estate market, which is characterized by an ever-expanding portfolio of luxurious residential and commercial properties. As the UAE continues to establish itself as a global hub for business, tourism, and investment, the property management industry has evolved to meet the dynamic needs of both property owners and tenants. One of the most prominent features of the property management industry in the UAE is its diversity. From high-end residential towers on the Palm Jumeirah in Dubai to modern office spaces in the financial district of Abu Dhabi, the UAE offers a wide range of property types and clientele. Property management companies in the UAE are well-versed in tailoring their services to meet the unique requirements of each property, whether it is maintaining a luxurious villa or a state-of-the-art commercial complex. This adaptability has allowed the industry to thrive in a market where both local and international investors seek to maximize their real estate assets (Kowalski, S.P., 2018).

The competitive nature of the UAE property management sector has also led to a focus on innovation and customer service excellence. Many property management companies in the UAE have adopted cutting-edge technologies to improve the efficiency of their operations. These technologies often include smart building solutions, predictive maintenance, and advanced tenant management systems. Furthermore, the industry's emphasis on customer service ensures that property owners and tenants receive the highest standard of care, creating a harmonious and hassle-free experience in a market that is known for its high standards. Moreover, the UAE's property management industry is subject to a robust legal framework that helps safeguard the rights and interests of all stakeholders. The regulatory environment ensures that property management companies adhere to strict guidelines, and contracts are typically well-defined, offering clarity and security to property owners. This legal framework helps instil trust in the industry, attracting both domestic and international investors who seek the stability and reliability that the UAE offers (Mawed, M.M., 2018).

Hence, the property management industry in the UAE is a dynamic and thriving sector. With its adaptability to diverse property types, a strong focus on innovation and customer service, and a well-regulated environment, the industry continues to be a key player in supporting the growth and sustainability of the UAE's real estate market. As the UAE's reputation as a global economic powerhouse continues to grow, so too does the importance of the property management industry in facilitating the management and maintenance of its ever-expanding property portfolio (Othman, A.A.E., 2007; Kowalski, S.P., 2018).

2.1.1 Real Estate Economy of Dubai

Dubai's real estate sector stands as a testament to the city's dynamic economic prowess and visionary urban development. Renowned for its iconic skyline, opulent structures, and strategic planning, the real estate economy in Dubai has emerged as a cornerstone of the city's economic success (Joghee, S., Alzoubi, H.M. and Dubey, A.R., 2020; Waters, M., 2023).

The roots of Dubai's real estate boom can be traced back to the late 20th century, marked by ambitious projects such as the construction of Port Rashid. This period saw the convergence of factors, including the discovery of oil, that fuelled the city's construction aspirations. The late 1990s witnessed a surge in property development, with monumental structures like the seven-star Burj Al Arab and the towering Emirates Towers shaping Dubai's global identity.

Key entities have played instrumental roles in shaping Dubai's real estate landscape. The founding of Emaar Properties in 1997, now the largest real estate company in Dubai, signalled a new era of development. The Nakheel Company, a government-owned entity, also contributed significantly, reflecting the commitment of Sheikh Mohammed to foster real estate growth.

The real estate sector's impact on Dubai's economy is profound. Not only does it contribute substantially to the GDP, but it also stimulates economic growth through increased investments, job creation, and a ripple effect on various supporting industries. The sector's resilience and adaptability have been evident in the face of global economic shifts, positioning Dubai as a stable and attractive market for investors.

In recent years, Dubai's real estate economy has experienced notable trends. The percentage contributions to the GDP have seen an upward trajectory, reaching a peak of 7.2 percent in 2019. Both the volume and value of real estate transactions have surged, with the city witnessing a continuous influx of real estate investments. The market's liquidity, supported by favourable oil and gas prices, has further fuelled its success.

Dubai's real estate market has garnered global attention, attracting investors from around the world. Factors such as the city's strategic location, modern infrastructure, and a business-friendly environment contribute to its international appeal. The success of the real estate sector intertwines with Dubai's broader economic diversification efforts, positioning the city as a global hub for business, tourism, and luxury living.

While the real estate sector in Dubai has experienced remarkable growth, it is not without challenges. Market fluctuations, changing global economic conditions, and the need for sustainable development present ongoing considerations. However, these challenges also open doors to opportunities for innovation, eco-friendly development, and the incorporation of smart technologies to ensure the long-term resilience of Dubai's real estate economy (Elsheshtawy, Y., 2019).

In conclusion, Dubai's real estate economy stands as a beacon of innovation and prosperity, reflecting the city's commitment to visionary development. With a rich history, influential players, and a global impact, Dubai's real estate sector continues to shape the city's narrative as a thriving metropolis at the intersection of tradition and modernity.

2.1.2 Performance of Real Estate Sector in Dubai

Real estate sector, a key driver of Dubai's economic growth, significantly impacts the city's economy. The GDP growth rate at constant prices serves as a crucial indicator of economic expansion, and recent record growth rates in Dubai can be attributed to government policies and incentives designed to foster economic growth across various sectors. In 2019, Dubai's GDP rose to AED 407 billion, marking a 2.2% increase from the AED 389 billion recorded in 2018. The real estate activities sector, contributing 7.2% to GDP growth in 2019, witnessed an added value increase of AED 29.4 billion, or 3.3%, compared to 2018. This sector played a pivotal role in Dubai's recent economic surge, with its percentage contributions to the economy rising from 6.3% in 2014 to a peak of 7.2% in 2019. The significance of the real estate sector to Dubai's economic activities is underscored by both the increasing volume and value of real estate transactions, a trend that persisted in the early months of 2020.

In 2019, real estate transactions exceeded 57,000, marking an 8% increase from 2018. The total value of these transactions rose by approximately AED 226 billion, a 2.1% growth from AED 221 billion in 2018 to AED 226 billion in 2019. This growth was driven by a substantial increase in the value of sales and mortgages, with the value of real estate transactions reaching AED 81 billion in 2019, up from AED 77 billion in 2018, reflecting a growth rate exceeding 5%. The mortgage value increased to AED 125 billion, a 4% rise from AED 120 billion in 2018. Moreover, the number of real estate investments in 2019 surpassed 47,000, indicating an 18% annual increase from 2018's 40,000 investments. The number of real estate investors also experienced significant growth, with over 34,000 in 2019 compared to 29,846 in 2018, representing a growth rate of 14%. This surge in real estate investments in 2019 surpassed the figures from 2016 when there were approximately 32,000 investors.

Dubai's real estate market success can be attributed to key factors, including market turbulence in Western regions, low-interest rates attracting investors, increased investments from Russia, and continuous expansion in the tourism sector. The demand for real estate in Dubai has been fuelled by the growing economy and population, as well as the attractiveness of the property market to foreign investors, particularly after the partial liberalization of the sector in 2002. Additionally, the abundance of liquidity in the market, supported by high oil and gas prices in the UAE, has further contributed to the sector's success (Elsheshtawy, Y., 2019; Waters, M., 2023).

2.2 Property Project Management Success

Project management has evolved to encompass the arrangement, strategic planning, and vigilant supervision of a diverse array of projects spanning industrial, commercial, and information technology domains (Lock, 2007). These undertakings involve a complex web of tasks that demand effective oversight. Regardless of their specific fields, all projects share a fundamental characteristic: they chart new territories with their ideas and actions. However, in the realm of project management, the ever-present spectre of risk can obstruct the seamless execution of a project, making precision and risk mitigation strategies indispensable (Otra-Aho et al., 2019). Project management represents a dynamic process that leverages the available resources within an organization to guarantee the systematic and controlled achievement of objectives, aligning seamlessly with the organization's unique requirements. This process unfolds within the context of a defined set of variables and constraints. The ultimate success of any project hinges on how efficiently it is managed concerning both cost and time parameters (Young, 2013). The components essential for the project's success are depicted in the figure 1.

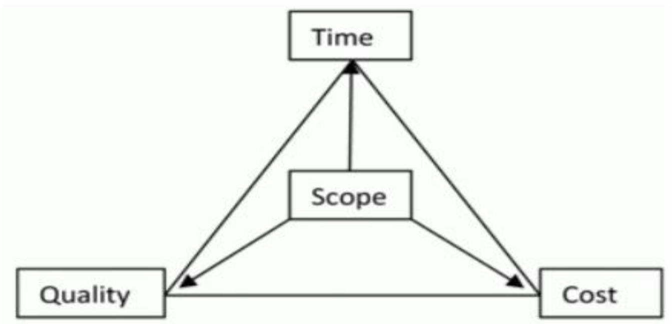

Fig. 1 - Components of Project Success
Source : (APM, 2015)

A project's success depends on how well the team manages it. Effective team management is crucial for a project to thrive. Project management involves handling different tasks to achieve specific goals. In today's context, different explanations help us understand project management from various angles, showing how it has changed over time. Initially, it was a management concept, but now it is relevant in all sectors, if it meets its objectives (Keegan et al., 2017).

Time: Efficient time management not only boosts staff productivity but also simplifies handling stress, pressure, and conflicts. It contributes to maintaining a healthy work-life balance and keeps motivation levels high. Time management training is a highly effective way to enhance team's performance. The training equips participants with specialized planning and management tools, enabling better control over their time and performance (Antoncic & Hisrich, 2003). In project management, effective utilization of time to meet project goals and ensure timely completion is crucial. This practice, known as time management in project management, requires project managers to uphold organization, productivity, and punctuality within their teams (Sanchez et al., 2017). Every project must have a completion date. Achieving this deadline necessitates having a clear schedule and efficiently managing the time of team members and project leaders.

Cost: Project cost estimation plays a vital role in project planning. It involves creating an approximate budget for the resources needed to complete various project activities. The accuracy of these cost estimates is crucial for informed management decisions and control to achieve project goals. Efficient cost estimation holds great significance for both clients and contractors. It helps in making the initial decision to proceed with a project (PMBOK 2000:86). Project Cost Management, a strategy for managing costs and productivity throughout the entire project lifecycle using technology, involves various project management tasks such as estimating, controlling, data collection, scheduling, accounting, and design. Cost management is the process of estimating, allocating, and managing project expenses, allowing companies to predict and prevent budget overruns (Sanchez et al., 2017). Cost estimates are generated during the project planning phase and must be approved before construction begins. Throughout the project's execution, expenses are documented and monitored to ensure adherence to the budget. Upon project completion, a comparison is made between predicted and actual costs, providing a basis for future cost management strategies and project budgets (Lotfi et al., 2020).

Quality: Project quality management involves the practice of ensuring consistent quality standards throughout a project's lifecycle. Quality management focus on maintaining a consistent level of quality across all project aspects. Quality management and project management go hand in hand, as both prioritize customer satisfaction and assume that superior products lead to happy customers. The primary goal of project quality management is to ensure that the project fulfils its intended purpose (Haq et al., 2018). Numerous studies have explored the relationship between quality management and organizational performance. Many of these studies have found a positive correlation between Total Quality Management (TQM) and organizational performance (Momeni et al., 2019).

Scope: Project scope management is part of the planning process where it assists in creating a list of all project goals, tasks, deliverables, deadlines, and budgets (Stretton, 2019). A big project frequently alters as it progresses in project management. In project management, scope refers to the anticipated features and functionalities of a product or the range of tasks necessary to finish a project. While, scoping refers to the process of obtaining the data needed to start a project, such as the qualities that a product must have to satisfy the needs of its stakeholders (Ahmad et al., 2019).

2.3 UAE Real Estate Innovation

Real estate sector in the United Arab Emirates (UAE) has undergone a remarkable transformation driven by a commitment to innovation, technological advancements, and forward-thinking policies. This evolution has positioned the UAE as a global leader in real estate development, setting new benchmarks for sustainability, efficiency, and luxury (Byat, A.B. and Sultan, O., 2014; Khan, M.U.H., 2019; Jeidane, M.E.M. and Bennani, A.H., 2021).

The UAE has embraced cutting-edge technologies to redefine the real estate landscape. From virtual reality (VR) property tours to blockchain-based transactions, the industry has witnessed a digital revolution. These technologies enhance customer experiences, streamline processes, and provide transparency, fostering a more efficient and responsive real estate market.

In response to global environmental challenges, the UAE real estate sector has prioritized sustainability. Green building practices, energy-efficient designs, and the incorporation of renewable energy sources have become integral components of development projects. The UAE's commitment to sustainable real estate not only aligns with global environmental goals but also reflects a dedication to creating resilient and future-proof communities.

The concept of smart cities has gained prominence in the UAE's real estate innovation journey. Integration of the Internet of Things (IoT) allows for smart infrastructure, intelligent transportation systems, and enhanced connectivity. From smart homes with automated features to entire city ecosystems designed for efficiency and convenience, the UAE is at the forefront of leveraging technology to create intelligent and interconnected urban spaces.

The UAE real estate sector has redefined luxury living, setting new standards for opulence and exclusivity. Iconic structures, such as the Burj Khalifa and Palm Jumeirah, showcase not only architectural brilliance but also a commitment to offering residents and investors unparalleled lifestyles. The incorporation of luxury amenities, high-end finishes, and world-class services distinguishes UAE real estate on the global stage.

The UAE has implemented progressive regulatory frameworks to support real estate development. Striking a balance between investor protection and industry growth, these regulations promote transparency and accountability. Initiatives such as long-term visas for investors and retirees contribute to a stable and attractive real estate market.

Innovative financing models and investment solutions have played a crucial role in driving the UAE's real estate sector. Real Estate Investment Trusts (REITs), crowdfunding platforms, and flexible mortgage options provide diverse opportunities for both local and international investors. These initiatives contribute to the accessibility and inclusivity of the real estate market.

The agility of the UAE's real estate sector is evident in its response to economic challenges and global crises. Amidst market fluctuations, the industry has demonstrated resilience and adaptability. Diversification strategies, agile business models, and a commitment to maintaining a robust market have allowed the UAE to navigate uncertainties effectively.

In conclusion, the innovation of the UAE real estate sector transcends traditional boundaries, embracing technology, sustainability, luxury, and regulatory advancements. As a result, the UAE stands as a beacon of pioneering excellence in the global real estate landscape, continually setting new benchmarks and reshaping the future of urban living. The commitment to innovation positions the UAE as a dynamic and adaptive leader in the ever-evolving world of real estate development.

3. Conceptual Model

This study aims to establish a relationship between project management determinants and UAE property organizational performance determinants with innovation determinants as a mediator. This relationship is depicted as figure 2.

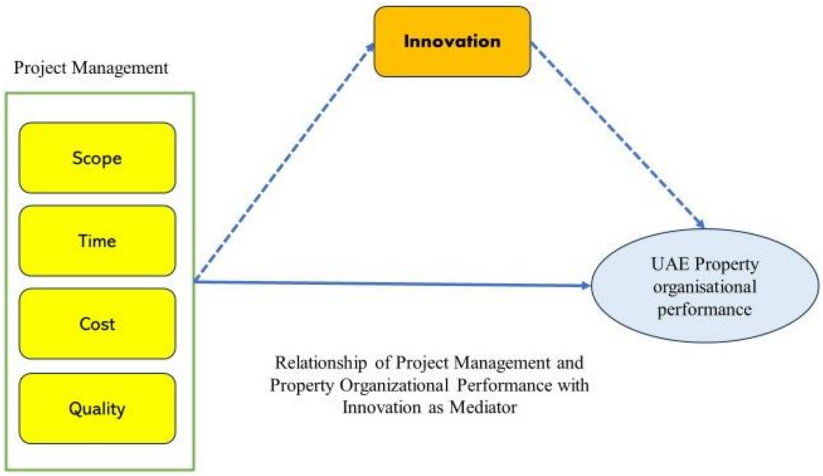

Fig. 2 - Conceptual model

Figure 2 indicates that project management determinants of factors comprise of four groups namely scope, time, cost, and quality act as independent variables. While, the UAE property organizational performance determinants act as dependent variable and innovation determinants act as mediator variable.

4. Partial Least Squares Structural Equation Modelling (PLS-SEM)

This study aims to construct a structural equation model derived from the conceptual framework, focusing on the correlation between project management determinants as independent variables and the performance of real estate companies in the United Arab Emirates (UAE) as the dependent variable. Additionally, innovation determinants are incorporated as mediator variables. The Partial Least Squares Structural Equation Modelling (PLS-SEM) approach is chosen for its suitability and robustness, particularly in handling complex higher-order constructs (Lee, Haque, Maulan, Abdullah, & Kumar, 2019). PLS-SEM, a second-generation variance-based statistical tool, is employed to explore and validate causal connections among latent constructs. The primary objective is to establish a path model that delineates the theoretical and logically reasoned connections between variables (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).

The two-stage structure of PLS-SEM involves a sequential evaluation process (J. F. Hair et al., 2014). The initial stage assesses the measurement (outer) model, examining relationships among items or indicator variables within each construct. It is imperative to conduct this assessment before progressing to the second stage, which involves evaluating the structural (inner) model that explicates connections among all constructs in the model (Ramayah, Lee, & In, 2011; Wong, 2013; Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). The evaluation of measurement models includes crucial aspects such as assessing the reliability of individual constructs, examining convergent validity using the Average Variance Extracted (AVE), and evaluating discriminant validity (K. K. Wong, 2016). Meeting specific minimum standards for these measurement models is imperative before proceeding to estimate the structural model.

In the second stage, the assessment of the structural model involves scrutinizing factors like path coefficients, determining R-squared (R^2) values, assessing effect sizes, predictive relevance, and evaluating the overall goodness of fit of the model (Henseler & Sarstedt, 2013; Kee & Rahman, 2017; Lowry & Gaskin, 2014; Usman & Lizam, 2016). This comprehensive evaluation unveils the relationships and dynamics among the constructs, constituting a fundamental step in PLS-SEM analysis.

The data used to construct the model were derived from 106 real estate companies in the UAE, representing the entire workforce of these companies. This encompasses 13,207 individuals across various management levels, including top, middle, and low management positions (UAE Ministry of Human Resource and Emiratization, 2021). A total of 390 questionnaires were distributed using traditional random sampling techniques, however, the model being constructed based on the responses from 375 completed questionnaires.

4.1 Assessment of Measurement Models

The initial phase of PLS-SEM evaluation involves scrutinizing measurement models for reliability, convergent validity, and discriminant validity. The assessment of measurement model reliability relies on composite reliability, employing Dillon-Goldstein's (or Joreskog's) rho to measure the homogeneousness of a block (V. E. Vinzi, Trinchera, & Amato, 2010). Subsequently, the focus shifts to evaluating convergent validity and discriminant validity (Jeo F Hair et al., 2014).

Convergent validity is appraised by examining factor loadings, which indicate the variance explained, and the Average Variance Extracted (AVE) to gauge the model's ability to explain indicators' variance (K. K. Wong, 2016). Consequently, outer loadings should be significant (Lowry & Gaskin, 2014), preferably exceeding 0.7 (Joe F Hair, Sarstedt, Ringle, & Mena, 2011). In cases where factor loadings fall below 0.4 or slightly above, Hair et al. (2014) recommend item deletion if it improves the AVE. The AVE, deemed significant for a particular measurement model when above 0.5, adds another layer of assessment (Bagozzi & Yi, 1988).

Discriminant validity is examined through the Hetero-trait Monotrait (HTMT) ratio, Fornell and Larcker criterion, and cross loadings. These metrics collectively offer a comprehensive understanding of the distinctiveness of constructs within the model, providing insights into their discriminant validity. This meticulous evaluation process ensures the robustness and accuracy of the measurement models in the PLS-SEM analysis.

4.1.1 Measurement Models Reliability

The assessment of measurement model reliability is a pivotal phase, employing composite reliability as a vital tool to gauge the consistency and dependability of the scale's measurements over time (Lowry & Gaskin, 2014). In a manner akin to Cronbach's alpha, composite reliability assesses internal consistency by indicating how effectively a construct is measured by its observable variables (Memon & Rahman, 2014). While Cronbach's alpha is traditionally used for reliability assessment, the preference for composite reliability is emphasized, particularly in the context of PLS-SEM analysis (Joe F. Hair, Sarstedt, et al., 2011; K. K. Wong, 2016).

Various scholars have put forth recommendations regarding acceptable thresholds for measurement models or constructs to be deemed reliable. It is commonly advocated that a composite reliability value of 0.7 or higher signifies internal consistency and reliability (Pallant, 2011; Wong, 2013; Hair et al., 2011). Although a preference exists for a composite reliability value of 0.7 or higher, a value of 0.6 is still considered acceptable for confirming reliability (Chin, 1998; Hair et al., 2014). The composite reliability values for the measurement models under scrutiny are presented in Table 1.

Table 1 - Reliability of Reflective Constructs

Construct	No. of items	Composite Reliability	Average Variance Extracted (AVE)
Cost	5	0.846	0.709
Innovation	5	0.841	0.699
Performance	5	0.809	0.683
Quality	5	0.830	0.681
Scope	5	0.846	0.754
Time	5	0.858	0.786

The composite reliability of the lower-order reflective measurement models is presented in Table 1. The results indicate that all 30 constructs examined in the study demonstrate composite reliability values surpassing the recommended threshold of 0.7, with the lowest value recorded at 0.809. These findings affirm that the measurement models have effectively met the necessary standards for reliability.

4.1.2 Assessment on Convergent Validity

Convergent validity assesses the extent to which an item establishes connections with other measures of the same phenomenon (Jeo F. Hair et al., 2014). It gauges the ability of the measurement model to clarify the variability within observable items (K. K. Wong, 2016), assuming that the average covariance among manifest variables should not be negative (Memon & Rahman, 2013). Reflective measurement models evaluate convergent validity through various criteria, including factor loadings and their significance, Average Variance Extracted (AVE), and the number of iterations required for the model to converge (Hair et al., 2014, 2011; Hair et al., 2015; Lowry & Gaskin, 2014; Memon & Rahman, 2013; Wong, 2016). In contrast, formative measurement models assess convergent validity by scrutinizing the significance of path weights leading to Higher Order Constructs (HOCs) (Sarstedt et al., 2019).

For reflective models, it is imperative that indicators or items demonstrate substantial loadings of 0.50 or higher on their corresponding outer models (Hair et al., 2010). Additionally, an AVE value of 0.50 or greater is preferred, and consideration should be given to removing items, if necessary, while ensuring each construct retains a minimum of two items (Hair et al., 2014). The AVE should also reach or exceed 0.5 (Hair et al., 2014; Lowry & Gaskin, 2014; Wong, 2016; Fornell & Larcker, 1981; Bagozzi & Yi, 1988). Furthermore, outer loadings are expected to converge within a fewer number of iterations compared to the maximum allowed iterations (K. K. Wong, 2016). In accordance with these established criteria, the study's evaluation of convergent validity for the measurement models is presented in Tables 2.

Table 2 - Convergent Validity for Reflective Models

Factors	CST	INN0	PFM	QTY	SCP	TIM
AVE	*0.564*	*0.547*	*0.676*	*0.599*	*0.530*	*0.550*
CST1	0.881					
CST2	0.865					
CST3	0.531					
CST4	0.684					
CST5	0.901					
INO1		0.532				
INO2		0.793				
INO3		0.952				
INO4		0.949				
INO5		0.530				
PFM1			0.722			
PFM2			0.541			
PFM3			0.602			
PFM4			0.837			
PFM5			0.825			
QTY1				0.641		
QTY2				0.554		
QTY3				0.850		
QTY4				0.699		
QTY5				0.753		
SCP1						
SCP2					0.511	
SCP3					0.741	
SCP4					0.806	
SCP5					0.848	
TIM1						0.802
TIM2						0.618
TIM3						0.840
TIM4						0.684
TIM5						0.743

Table 2 demonstrates that the retained factor loadings consistently exceed the 0.7 threshold. Additionally, all measurement models exhibit Average Variance Extracted (AVE) values surpassing the recommended minimum of 0.5, as proposed by Bagozzi & Yi (1988). Furthermore, the convergence of the measurement models is swift, necessitating only a few iterations to meet the 'stop change criteria,' notably below the maximum limit of 300. This efficient convergence process, in line with Wong's guidelines (2013), signifies a robust estimation of the measurement models.

4.1.3 Assessment on Discriminant Validity

In multivariate analysis, ensuring the distinctiveness of constructs is paramount. Within the realm of Partial Least Squares Structural Equation Modeling (PLS-SEM), achieving this distinctiveness is accomplished through a rigorous assessment of discriminant validity. Discriminant validity gauges the extent to which a specific measurement model stands apart from others, evaluating its capacity to measure its intended phenomena, as underscored by Hair et al. (2014) and Memon & Rahman (2013).

According to Hair et al. (2014), discriminant validity provides assurance that a measurement model is truly unique and possesses the ability to capture phenomena not covered by other constructs within the model. Various criteria, such as the Heterotrait-Monotrait Ratio (HTMT), the Fornell and Larcker criterion, and the cross-loadings criterion, are employed to evaluate discriminant validity, collectively contributing to ensuring the distinctiveness and validity of the measurement model.

The Heterotrait-Monotrait Ratio (HTMT) is a key metric for assessing discriminant validity, calculated as the average of heterotrait-heteromethod correlations relative to the average of monotrait-heteromethod correlations (Henseler, Ringle, & Sarstedt, 2015). Discriminant validity is confirmed when the HTMT ratio with other measurement models is below 0.85, or more liberally, below 0.9 (Henseler et al., 2015).

The Fornell and Larcker criterion, developed by Fornell and Larcker (1981), offers another method for assessing discriminant validity. This criterion posits that the correlation of any construct with other constructs should not surpass the square root of the Average Variance Extracted (AVE) of that specific construct. Although considered conservative, this criterion is widely acknowledged (J.F Hair et al., 2014).

Moreover, the cross-loading criterion, endorsed by Chin (1998), stipulates that items should exhibit stronger loadings on their designated construct than on any other constructs. This approach, seen as more liberal in determining discriminant validity (J.F Hair et al., 2014), was employed alongside the Fornell and Larcker criterion in this study. The results of these discriminant validity assessments are presented in Tables 3 and 4, collectively contributing to the comprehensive evaluation and assurance of the distinctiveness and validity of the measurement models.

Table 3 - Cross loading factor

Factors	COST	INNO	PFM	QTY	SCOPE	TIME
CST1	***0.881***	0.742	0.481	0.636	0.742	0.801
CST2	***0.865***	0.945	0.609	0.676	0.822	0.715
CST3	***0.531***	0.134	0.016	-0.060	0.035	0.093
CST4	***0.684***	0.559	0.720	0.621	0.596	0.562
CST5	***0.901***	0.793	0.520	0.699	0.806	0.840
INO1	0.208	***0.532***	0.431	0.396	0.266	0.353
INO2	0.848	***0.793***	0.503	0.658	0.747	0.797
INO3	0.866	***0.952***	0.612	0.676	0.823	0.716
INO4	0.839	***0.949***	0.604	0.672	0.804	0.702
INO5	0.356	***0.530***	0.205	0.256	0.317	0.305
PFM1	0.681	0.553	***0.722***	0.635	0.614	0.571
PFM2	0.201	0.164	***0.541***	0.315	0.330	0.252
PFM3	0.324	0.321	***0.602***	0.282	0.212	0.569
PFM4	0.653	0.594	***0.837***	0.749	0.734	0.722
PFM5	0.424	0.501	***0.825***	0.703	0.527	0.629
QTY1	0.479	0.409	0.349	***0.641***	0.687	0.475
QTY2	0.274	0.199	0.502	***0.554***	0.511	0.338
QTY3	0.531	0.535	0.637	***0.850***	0.741	0.576
QTY4	0.901	0.793	0.520	***0.699***	0.806	0.840
QTY5	0.466	0.560	0.793	***0.753***	0.568	0.684
SCP1	0.479	0.409	0.349	0.641	***0.687***	0.475
SCP2	0.274	0.199	0.502	0.554	***0.511***	0.338
SCP3	0.531	0.535	0.637	0.850	***0.741***	0.576
SCP4	0.901	0.793	0.520	0.699	***0.806***	0.840
SCP5	0.840	0.932	0.620	0.698	***0.848***	0.721
TIM1	0.883	0.745	0.482	0.637	0.743	***0.802***
TIM2	0.373	0.333	0.577	0.320	0.261	***0.618***
TIM3	0.901	0.793	0.520	0.699	0.806	***0.840***
TIM4	0.466	0.560	0.793	0.753	0.568	***0.684***
TIM5	0.554	0.548	0.668	0.711	0.679	***0.743***

Table 3 of the cross-loading reveals associations between different constructs (COST, INNO, PFM, QTY, SCOPE, TIME) and their respective items. It indicates that most items align well with their designated constructs, exhibiting strong positive connections.

Table 4 - Discriminant validity using Fornell and Larcker criterion

Construct	COST	INNO	PEM	QTY	SCP	TIM
COST	***0.751***					
INNO	0.824	***0.939***				
PEM	0.694	0.657	***0.790***			
QUALITY	0.783	0.754	0.720	***0.887***		
SCOPE	0.892	0.868	0.728	0.938	***0.928***	
TIME	0.873	0.822	0.823	0.865	0.849	***0.942***

Table 4 displays the results of the discriminant validity assessment using the Fornell and Larcker criterion. The square root of the Average Variance Extracted (AVE) is highlighted diagonally in bold italics. Both horizontally and vertically, the figures represent the correlations among the research constructs. The findings affirm that all lower-order constructs (LOCs) meet the specified condition. Instances of higher correlations among LOCs are observed exclusively with their corresponding higher-order constructs (HOCs), aligning with the expectations outlined by Sarstedt et al. (2019). Consequently, the research successfully establishes discriminant validity based on the Fornell and Larcker criterion.

4.2 Assessment on Structural Model

The second phase of Partial Least Squares Structural Equation Modeling (PLS-SEM) evaluation centres on scrutinizing the structural (inner) model. This model establishes the interrelationships among measurement models and delineates the anticipated causal effects of exogenous measurement models on the endogenous latent measurement models (J.F Hair et al., 2014). These hypothesized interrelationships are pivotal for addressing research questions and achieving research objectives. Evaluating the structural model involves assessing its predictive capability concerning the endogenous models (Ali Memon et al., 2019; J.F Hair et al., 2014).

The quality assessment of the structural model encompasses various essential facets. This includes analysing the path coefficients strength, determining coefficients of determination (R2), measuring effect sizes (f2), evaluating predictive relevance, and assessing the goodness of fit of the structural model (Goh, Ali, & Rasli, 2014; J.F Hair et al., 2014; Usman & Lizam, 2016; V.E. Vinzi et al., 2010). These evaluation criteria will be further expounded upon in the following sections. Based on these, the structural model is specified and presented in figures 3 showing the path coefficients and their significance respectively.

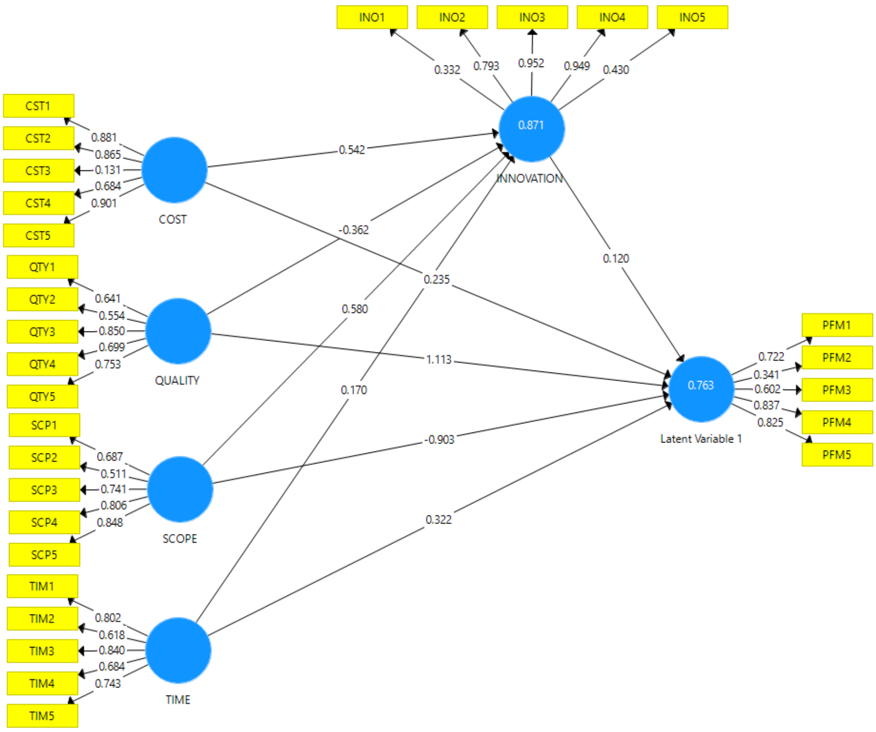

Fig. 3 - Model of the study

Figure 3 visually represents the structural model, featuring path coefficients and the crucial Coefficient of Determination (R2). This model incorporates three Higher-Order Constructs (HOCs), blending reflective and formative elements. Notably, one HOC serves as a pivotal mediator, adding complexity to the structural dynamics. Contrastingly, the figure offers valuable insights into the statistical significance of each path within the structural model through displayed t-statistics associated with path coefficients. These statistics act as indicators of the significance level for each path, illuminating the robustness and reliability of the examined relationships. These visual representations not only clarify the structural relationships and their significance but also serve as powerful tools for unravelling the intricate web of interactions within the research model, contributing to a comprehensive understanding of its inner workings.

4.2.1 Path Coefficients Evaluation

The strength of each pathway leading from the exogenous constructs to the endogenous construct is evaluated by examining the path's coefficient. These pathways represent the hypothesized relationships within the structural model. The path coefficients range from -1 to +1, with values closer to 1 indicating a stronger relationship, while values closer to 0 suggest weaker relationships. Positive values signify positive relationships, whereas negative values indicate negative relationships between the models (J F Hair et al., 2014). These coefficients serve as quantifiers of the strength of connections among the research constructs embedded within the structural model, effectively representing the extent of their relationships. It is imperative for these path coefficients to demonstrate statistical significance to ensure the overall quality of the structural model. For a detailed presentation of the path coefficients pertinent to this study, refer to Table 5, which encapsulates the essential findings related to the relationships between the research constructs.

Table 5 - Path ranking/strength

Path relationship	Path strength	Ranking of the strength	T Statistics (>1.96)	P Values (<0.05)	Significant / Not significant
CST -> PFM	0.706	4	4.161	0.000	Significant
QTY -> PFM	1.137	2	10.035	0.000	Significant
SCP -> PFM	-1.019	3	6.513	0.000	Significant
TIM -> PFM	1.212	1	10.391	0.000	Significant
INNO -> PFM	-1.179		7.559	0.000	Significant
TIM -> INNO	0.772	1	23.363	0.000	Significant
CST -> INNO	0.374	2	9.555	0.000	Significant
QTY -> INNO	-0.037	Not accepted	**0.873**	**0.383**	Not Significant
SCP -> INNO	-0.121	3	2.145	0.032	Significant

#note: IV-independent variables; DV-dependent variable

Table 5 serves as a visual representation of the expected relationships among the exogenous constructs, mediator construct, and the endogenous construct within the structural model. The results indicate that out of the 9 direct relationships paths. Four paths between IV to DV; one path between mediator to DV; and four paths between IV to mediator. For the ranking of the paths between IV to DV, the strongest path is time to performance (TIM -> PFM) and the weakest is cost to performance (CST -> PFM). For the ranking of the paths between IV to mediator, the strongest is time to innovation (TIM -> INNO) and the weakest is scope to innovation (SCP -> INNO).

4.2.2 Assessment of Coefficient of Determination (R2)

Coefficient of determination referred as R^2, holds significant importance as a criterion for assessing the quality of a structural model in Partial Least Squares Structural Equation Modelling (PLS-SEM). R^2 quantifies the model's predictive accuracy by elucidating the percentage of variance in the constructs within the model that can be explained by the exogenous constructs (Hair et al., 2014; Memon & Rahman, 2013). While there is no universally accepted threshold for evaluating R2, the field often relies on a rule of thumb championed by Hair et al. (2014) as a guideline. According to this rule, an R2 value of 0.25 is considered weak, 0.50 is seen as moderate, and 0.75 is deemed substantial (Hair et al., 2014; Wong, 2016). In the context of this study, the R^2 values are assessed using this established rule of thumb, and the results are presented in Table 6. This evaluation offers valuable insights into the model's ability to explain and predict variance in the constructs, contributing to a comprehensive understanding of its predictive power.

Table 6 - R2 Values

Construct	Code of Constructs	R Square values
Mediator	INNO	0.871
Endogenous	PFM	0.763

Table 6 presents the R^2 values for the study's model, it provides an overall R^2 for the key endogenous constructs of the research—INNO and PFM—with values of 0.871 and 0.759, respectively. It shows the R^2 values for INNO and PFM a perfect alignment. This outcome aligns with expectations, indicating that the lower-order constructs effectively explain the same variance in the variables as the higher-order constructs (Sarstedt et al., 2019; J.F. Hair et al., 2014)

4.2.3 Assessing the Model's Goodness-of-Fit (GoF)

The GoF (Goodness of Fit) index aims to clarify the performance of the PLS model, spanning both the measurement and structural models, with a particular focus on the model's overall predictive capability (Memon & Rahman, 2013). Aligned with Akter's classification (2011), GoF is categorized having predictive capability as small, medium, or large when its values are 0.1, 0.25, and 0.36, respectively. The model fitness values resulting from the modelling process are detailed in Table 7.

Table 7 - Model fitness values

Code	Construct	Average Variance Extracted (AVE)	R^2 values
CST	Cost	0.709	
INNO	Innovation	0.699	0.871

PFM	Performance	0.683	0.763
QTY	Quality	0.681	
SCP	Scope	0.754	
TIM	Time	0.786	
	Average	**0.719**	**0.817**

Table 7 shows the average values of AVE and R2 of the model. By applying the GoF calculation as follow;

$$\text{Goodness-of-Fit, } GoF = \sqrt{0.719\ X\ \ 0.817}$$
$$= \sqrt{0.587}\ = 0.766$$

The outcome of the GoF calculation yields a value of 0.766 which indicates the model attain large predictive capability.

4.2.4 Hypothesis Testing

To evaluate the significance of the path model, t-statistics and P-values are employed using resampling techniques known as bootstrapping (Wong, 2016). In this study, a total of 5,000 bootstrapping samples were utilized to robustly assess the significance of the structural model. The path coefficients derived from the structural models are thoroughly presented in Table 8, in alignment with the specified research hypotheses.

Table 8 - Results of hypothesis testing

Constructs' Relationship	Direct / Indirect	T Statistics (>1.96)	P Values (<0.05)	Significant / Not significant
CST -> INNO	Direct IV to mediator	9.555	0.000	Significant
CST -> PFM	Direct IV to DV	4.161	0.000	Significant
INNO -> PFM	Direct mediator to DV	7.559	0.000	Significant
QTY -> INNO	Direct IV to mediator	0.873	0.383	Not Significant
QTY -> PFM	Direct IV to DV	10.035	0.000	Significant
SCP -> INNO	Direct IV to mediator	2.145	0.032	Significant
SCP -> PFM	Direct IV to DV	6.513	0.000	Significant
TIM -> INNO	Direct IV to mediator	23.363	0.000	Significant
TIM -> PFM	Direct IV to DV	10.391	0.000	Significant
CST -> INNO -> PFM	Indirect	4.624	0.000	Significant
QTY -> INNO -> PFM	Indirect	0.900	0.369	Not Significant
SCP -> INNO -> PFM	Indirect	1.811	0.071	Not Significant
TIME -> INNO -> PFM	Indirect	8.576	0.000	Significant

#note: IV-independent variables; DV-dependent variable

Figure 8 depicts 13 relationships among the variables, comprising 9 direct relationships and 4 indirect relationships. Among the direct relationships, 4 originate from the Independent Variable (IV) to the Dependent Variable (DV), 4 from the IV to the Mediator, and one from the Mediator to the DV. All direct relationships are statistically significant except one: QTY -> INNO. Regarding the indirect relationships, two out of the four relationships are not statistically significant: QTY -> INNO -> PFM and SCP -> INNO -> PFM.

4.2.5 Mediating Effect of Innovation

As outlined by Ghasemy et al. (2020), mediation effects manifest in various forms: full, partial, and no mediations. Full mediation occurs when the direct relationship is not significant, but the indirect relationship is. In contrast, partial mediation occurs when both the direct and indirect relationships are significant. Lastly, no mediation is observed when the direct relationship is significant, but the indirect relationship is not, or when both the direct and indirect relationships are not significant. Given that this study specifically aims to understand the mediation effect between the Independent Variable (IV) and Dependent Variable (DV), the pertinent relationships from Table 8 has been narrowed down, as detailed in Table 9.

Table 9 - Results of hypothesis testing

Constructs' Relationship	Direct / Indirect	T Statistics (>1.96)	P Values (<0.05)	Significant / Not significant
CST -> PFM	Direct IV to DV	4.161	0.000	Significant

QTY -> PFM	Direct IV to DV	10.035	0.000	Significant
SCP -> PFM	Direct IV to DV	6.513	0.000	Significant
TIM -> PFM	Direct IV to DV	10.391	0.000	Significant
CST -> INNO -> PFM	Indirect	4.624	0.000	Significant
QTY -> INNO -> PFM	Indirect	0.900	0.369	Not Significant
SCP -> INNO -> PFM	Indirect	1.811	0.071	Not Significant
TIME -> INNO -> PFM	Indirect	8.576	0.000	Significant

Therefore, through a comparison of the significance status of direct and indirect relationships in Table 9 with the criteria outlined by Ghasemy et al. (2020), the mediation effects are summarized in Table 10.

Table 10 - Mediation effect due to innovation as mediator

Mediating effect to the relationship		Results
INNO	CST -> PFM	Partial Mediation
INNO	QTY _ -> PFM	No Mediation
INNO	SCP_ -> PFM	No Mediation
INNO	TIM -> PFM	Partial Mediation

Table 10 illustrates that INNO, serving as the mediator variable, induces two instances of partial mediation and two instances without any mediation effect.

5. Summary

This paper presented a study on developing and assessing a relationship model of project management act as independent variable; innovation act as mediator; and the property organizational performance as dependent variable. Data was collected through questionnaire survey of 106 real estate companies employees in the UAE. A total of 390 questionnaires were distributed to these companies using traditional random sampling techniques. However, the model was constructed using the responses from 375 completed questionnaires. The collected data was used to develop the model in SmartPLS software. The developed model was analysed and assessed at the measurement and structural components of the model. It was found that all direct relationships are statistically significant except one: QTY -> INNO. Regarding the indirect relationships, two out of the four relationships are not statistically significant: QTY -> INNO -> PFM and SCP -> INNO -> PFM. Also, that INNO, serving as the mediator variable, induces two occurrences of partial mediation and two occurrences without any mediation effect. Besides, Goodness-of-Fit for the model is 0.766 which indicates the model attain large predictive capability.

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