A Better Modelling and Assessment of Key Factors Affecting Cost Performance of Building Projects: The Case of New Zealand

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Abstract　Project cost plays an important role in a project's success, and is an aspect of high concern to the project stakeholders. Although some studies have been undertaken to investigate the influencing factors of project cost, because of the continuous development in the field, this study is regarded as adding value to the construction industry in New Zealand. This study focuses on exploring the significant factors influencing project cost. The objectives of the study are to identify, assess and analyse the effects of the influencing factors on the cost of a project. A questionnaire survey was carried out among a selection of clients and developers. Structural equation modelling techniques were adopted to analyse the collected data. The results conclude that of all these four constructs, namely market conditions, key stakeholders' influences, building and construction regulations, and the external economic environment have a significant effect on building project costs. These factors should be appropriately monitored and controlled in a cost management situation in order to achieve project success. These findings attempt to help the industry management by identifying the key cost drivers and applying appropriate management techniques or interventions to enhance project cost performance.

Keywords　Project cost performance, Project cost, Key influencing factors, SEM, New Zealand

1. Introduction

According to [1], the cost is the most important consideration for a construction project and can be considered as one of the most important indicators of project success. Because of the complex nature of the construction industry, building project cost needs to be effectively managed and controlled so that projects are completed within budget [2]. To this end, stakeholders of building projects are bound to consider project cost seriously. A project cost which is not effectively controlled or monitored often increases construction cost, decreases investment confidence, and adversely impacts the overall project performance [3, 4]. Based on the background, an effective cost management system should be put in place. Based on [5], cost management is much more than simply monitoring the cost expenditure within budget. It means having the knowledge of how and why the costs occur and taking effective action based on the relevant information.

Much existing literature emphasises the importance of project cost management and control, yet that found was not comprehensive and was not systematically developed so as to explain the influencing factors of building project cost. Moreover, few studies and research has been performed in the New Zealand context. Instead of a broader study of cost management and control, this study sought to investigate the factors that affect building project cost. Although some studies and research have been undertaken world-wide to discuss this subject, there is a shortage of such studies in regard to New Zealand's construction industry. This study will contribute to the development of knowledge on project cost management in New Zealand.

2. Literature Review

The little research and the few studies reported in the construction management literature have mainly emphasised evaluating the individual effects of a variety of influencing factors on cost management, cost planning, and cost estimating. [6] explored the factors affecting construction cost in Malaysia. Findings from their study suggested that support from the clients, the financial ability of the contractors, and the experience and knowledge of the project team are the important cost drivers of construction cost.

As in the studies of [7], project cost can be significantly affected by material price fluctuations due to market influences. The findings were supported by [8] where the instability of market conditions presents a great challenge for the construction project to be completed within budget.

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Furthermore, the construction industry experiences significant variations in employment, products, and sales [9]. It is not uncommon for 20percent swings to occur in the output levels of the building industry [10, 11].

In addition, [12] said that housing is considered as both consumption goods and investment property; the highly inelastic demand, and supply, is the foundation of the property market. Finally, according to the findings of [13], unlike the government imposing restrictions on the exchange market, a highly competitive market exists in the real estate and construction industry due to there being plenty of multilevel buyers and suppliers. This highly volatile and competitive market would transfer lots of risks to the construction industry by way of costs, time and quality.

[14] described how the standards set down in the building code would influence the design and construction of building projects in Germany. Moreover, [15] also stated that project costs were increased by earthquake safety features requested by the building code of Nepal. Additionally, [16] examined how the construction act influences the payment conditions and adjudication costs in the construction industry in the UK. Their findings suggested that an ineffective operation of the construction contract would cause suffering for construction projects in respect of cost, time and quality.

[17] examined the relationship between the operational environment, competition strategies, and project success in the South African construction industry. Findings from their study suggested that an indirect relationship between the operating environment and project success was mediated by competitive strategies. [18] addressed that external economic environment and global influence pose a great challenge to the construction industry. From the findings of their study, global influences could effectively affect the construction resources either in the goods market or on the stock market.

Although previous studies and research have contributed knowledge on how project costs interact with their operating environment, the potential applications of the findings are limited. The data analysis techniques used in previous studies and research have mainly centred on observable influence variables and assessment of the impacts of these variables on the project cost.

3. Research Model

The research model provides a framework for exploring the relationships between the variables as shown in Figure **1**. There are four latent constructs in the model. Building project cost is the dependent variable with the six independent variables, namely key stakeholders' influences (KSI), market conditions (MC), building and construction regulations (BCR), and external economic environment (EEE).

The basic proposition which can be developed is:

P1: the building project cost can be properly managed by making efforts to manage the project stakeholders, and cope with different situations in the market, regulatory regimes,

and the external economic environments in which the project operates.

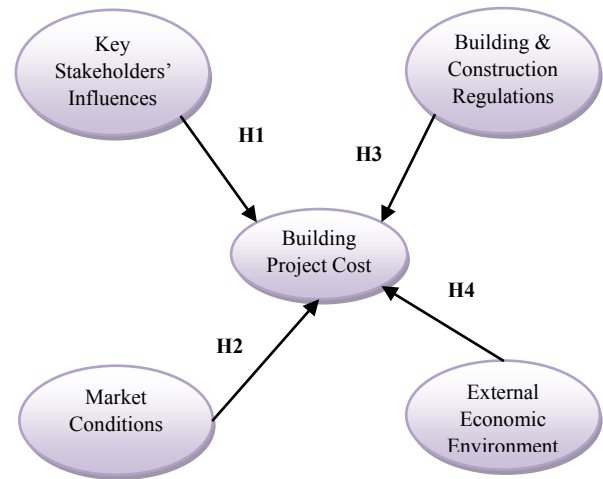Based on the basic proposition, the following hypotheses are developed:

Figure 1.   Proposed research model

H1: Key stakeholders' influences have a significant effect on building project cost.

H2: Market conditions have significant effects on building project cost.

H3: Building and construction regulations can significantly affect building project cost.

H4: External economic environment has a significant effect on building project cost.

The latent constructs used to test the hypotheses are discussed as follows:

3.1. Key Stakeholders' Influences

According to [19], the key stakeholders are clients, consultants, and contractors of building projects. [20, 21] carried out an empirical analysis and identified the contractors' experience and personnel skills as key factors for the project cost. [22, 23] evaluated the client influences on the project and concluded that client attitudes and leadership are critical to the project success as well as the project cost. [24, 25] also identified that collaboration and knowledge of the consultants play an important role in project cost performance. According to the previous studies and research, the key stakeholders' influences are comprised of clients' leadership and attitude, consultants' collaboration and knowledge, and contractors' experience and personnel skills.

3.2. Market Conditions

[26] have used the attributes like price stability and supply stability in their study to characterize the market conditions. Moreover, bidders' competition is one of the indicators for the market condition in the study conducted by [27]. Additionally, [28] also addressed that cyclical volatility is the nature of the real estate market and the construction industry. Finally, previous studies undertaken by [13]

described how the housing supply adjusts to the external shocks and how the markets adjust to the demand change. Therefore, this study characterized the market conditions by way of various indicators like price fluctuation, competition level, cyclical volatility, and supply and demand shocks.

3.3. Building and Construction Regulations

Regulatory factors concern regulatory intervention in providing an enabling environment for building construction projects [29]. Building and construction regulations are usually seen as a regulatory framework which has a direct effect on a project's performance. Indicators used to measure this construct are building codes [30], building consents [31], health and safety Acts [32], and construction contract Acts [33].

3.4. External Economic Environment

The indicators constitute the external economic environment including economic conditions, investment flow and availability of financing sources [34]. Failure to access financing sources seriously affects project cost performance [35]. However, global influences and natural majeure are two factors that are mostly beyond the control of project management teams. Based on the existing literature, five indicators were identified as the measures of an external economic environment construct.

These indicators are economic growth, investment tendencies, credit supply, global influences, and force majeure. The effect of these activities on building project costs in the construction industry was also addressed in different research and studies [36-40].

3.5. Measures of Building Project Cost in Construction

The term "cost" might represent different interpretations to different professionals in the construction industry. Its meaning usually lies in the context in which it is being used. [41] said that project cost should include construction costs plus the costs of the professional consultants' fees, the statutory fees, land cost, financing costs, and taxation. Regarding project costs, the term indicates different meanings and usually is not applied in a uniform manner [42]. In order to provide global consistency in defining, grouping, measuring, analysing and presenting entire cost at a project, national and international level, [43] categorised the components of project cost into three groups: capital construction costs, associated capital costs and site acquisition, and the client's other costs.

Bear in mind that, in order to achieve high reliability and clear classification, not only were methods such as literature survey, brainstorming, and pilot interview used, but also statistical techniques like the reliability test and principal component analysis. Their employment resulted in the measurement framework as displayed in Table **1**.

Table 1. Source of Measurement Instrument

Construct	Measurement Instrument	Source
Key stakeholders' influences (KSI)	Clients' leadership and attitude	[20-25]
	Consultants' collaboration and knowledge	
	Contractors' experience and personnel skills	
Market conditions (MC)	Price fluctuation	[13, 26-28]
	Competition level	
	Cyclical volatility	
	Supply and demand shocks	
Building and construction regulations (BCR)	Building codes	[30-33]
	Building consents	
	Health and safety Act	
	Construction contract Act	
External economic environment (EEE)	Economic growth	[36-40]
	Investment tendency	
	Credit supply	
	Global influences	
	Natural majeure	
Building project cost (BPC)	Capital construction cost	[43]
	Associated capital cost	
	Site Acquisition and client's other cost	

4. Methodology

This study is comprised of a pilot survey and a main questionnaire survey. Initially, an extensive literature review was performed to identify the key influencing factors for building project costs. Based on the results of the literature review, a list of influencing variables was developed. Subsequently, a pilot survey was carried out with 12 industry experts.

The websites of Property Institute of New Zealand and Property Council of New Zealand were used as the starting points to select suitable participants for the pilot survey. After checking the profiles of the register members, 15 members were approached and invited to take part. Emails were sent to them, stating the research objectives and the importance and the potential benefits for the sector. Twelve out of the 15 gave positive feedback and willingness to participate. They all have over 20 years' experience in the construction industry.

At the beginning of the pilot survey, a list of influencing factors and their corresponding indicators was presented to the participants who were requested to provide their perspectives on whether relevance exists between the factors and their corresponding indicators, and the importance of them. Moreover, they were also invited to provide additional factors or indicators that were not presented on the list but

are very important from their point of view. The demographic profiles of the participants were also recorded.

As a result of the pilot survey, the variables were re-worded and refined to improve clarity, and two new indicators were added. The modified and refined variables were used to design the main questionnaire survey.

The questionnaire comprised four sections. The first section is a covering letter that states the research aim and objectives, scope, human ethics notification, and an appreciation. The second section is the main part of the questionnaire where the influencing level of the measurement indicators was set out. The third section concerns demographics designed to collect background information about the participants such as profession, experience, and occupation. The final section is a request form that can be used by the participants to request the research findings.

The questionnaire, consisting of all the 22 measurement indicators, was designed to evaluate the impacts of the influencing factors on building project costs. The 22 variables were grouped into five categories based on the research model. The five-point Likert scale range from 1 to 5 was employed to assess the level of influence for each indicator on building project cost, where 1 represents a factor that is the not important to the building project cost and 5 represents a significantly important indicator.

The target population of this study is the registered members of Property Institute of New Zealand (PINZ) and Property Council of New Zealand (PCNZ). In terms of professions, these ranged from developer, property manager, asset manager, fund manager, etc. This semi-structured questionnaire was administrated nationally via a web-link (Survey Monkey). The potential respondents were informed about the questionnaire survey by sending e-mails to them.

A total of 620 questionnaires have been distributed to clients and developers. One hundred and forty-seven (147) were completed and proved useful, representing a 23.7% response rate. The summary of the respondents' profiles is shown in Table **2**.

Table 2. Demographic Information of the Respondents

Profession	%	Occupation	%	Experience	%	Organisation	%
Project Manager	52.8	Manager	58.8	10-15	21.2	Property Development	65.5
Developer	17.6	Senior Manager	22.4	16-25	29.8	Financial Institution	12.3
Capital Manager	23.5	Executives/ owners	15.1	>25	44.7	Real Estate	11.8
Other	6.1	Others	3.7	Others	4.3	Other	10.4

5. Data Analysis and Results

The results obtained from the pilot survey suggested that the respondents achieved consensus in that all of the factors and indicators identified from the literature review are important for building project costs in New Zealand.

However, they addressed two additional indicators that were not presented in the first list. These two indicators are credit supply and health and safety issues. Furthermore, the respondents also argued that local material prices are so high due to their relatively isolated zone and less-developed supply chain.

The collected data were analysed using the structural equation modelling approach with Amos version 23. Maximum likelihood technique was employed to estimate the parameters. The proposed research model comprises a measurement model and a structural model. The measurement model describes the relationship between the measurement indicators and corresponding latent constructs, while the structural model can explicitly model the direct, indirect and correlative effects among the latent constructs.

The proposed model incorporates the measurement indicators and corresponding latent constructs into a structural equation model based on the empirical findings and theory expectations. After several iterations had been performed, a satisfactory model was identified. A goodness-of-fit measure was introduced to assess and improve the fit of the model. Moreover, Cronbach's alpha, convergent validity, and discriminant validity tests have been undertaken to evaluate the reliability and validity of the model.

In this study, the data analysis was conducted by using SEM which includes three essential steps. First, the exploratory analysis is performed to ascertain the dimensions of the influencing factors based on the previous research and studies. Second, the confirmatory analysis is carried out to test the measurement model. Finally, structural equation modelling is conducted to test the relationships between the latent constructs. Furthermore, the reliability and validity tests are undertaken to evaluate the validity of the final model.

5.1. Principle Component Analysis

Although the latent constructs have been identified based on a literature review, in order to confirm these constructs, a factor analysis was carried out by using SPSS [44]. A measure of sampling adequacy was performed by SPSS, the Kaiser-Meyer-Olkin value of 0.78 exceeds the cut-off value of 0.5 [45]. The principal component analysis retains all the 16 measurement indicators; four factors adequately represent the data sample in terms of the total variance explained (71.2%) and grouping of the indicators. These factors are:

1. Key stakeholders' influences
2. Market conditions
3. Building and construction regulations
4. External economic environment

The data analysis results for the four factors are displayed in Table **3**. All the factor loadings for the indicators exceed the threshold value of 0.5 with loading ranging from 0.678 to 0.825. The results explored that all of the measurement indicators under the corresponding constructs represent one principal component factor.

Table 3. Rotated Factor Loadings of the Latent Constructs

Indicator	Latent Constructs				
	KSI	MC	BCR	EEE	BPC
Client's Attitude & Leadership	0.721				
Consultant's Collaboration & Knowledge	0.757				
Contractor's Experience & Personal Skill	0.726				
Price Fluctuation		0.808			
Competition Level		0.763			
Cyclical Volatility		0.698			
Supply and Demand Shocks		0.701			
Building Codes			0.716		
Building Consents			0.678		
Health and Safety Acts			0.765		
Construction Contract Acts			0.724		
Economic Growth				0.814	
Investment Tendency				0.687	
Credit Supply				0.708	
Global Influences				0.744	
Natural Majeure				0.738	
Capital Construction Cost					0.810
Associated Capital Cost					0.823
Site acquisition and client's other cost					0.825

Structural equation modelling analysis would be conducted in the following analysis to confirm the proposed research model and hypothetical relationships.

5.2. Confirmatory Factor Analysis

Confirmatory factor analysis was performed to confirm the findings from principal component analysis. As the regressions weights of all the indicators exceed the cut-off value of 0.5, the CFA results indicated that the measurement indicators used for corresponding constructs were representative of that construct. Moreover, the measurement model for these four constructs also has acceptable GOF indices: CMIN/df=1.789, GFI=0.895, AGFI=0.866,

CFI=0.93, RMSEA=0.043. The analysis results are shown in Table **4**.

Table 4. CFA Results

Variables	Abbr.	Factor loading	Cronbach's alpha
Key stakeholders' influences[a]	KSI		
Clients' leadership and attitude[b]	KSI1	0.81	
Consultants' collaboration and knowledge[b]	KSI2	0.85	0.812
Contractors' experience and personnel skills[b]	KSI3	0.80	
Market conditions[a]	MC		
Price fluctuation[b]	MC1	0.84	
Competition level[b]	MC2	0.82	0.879
Cyclical volatility[b]	MC3	0.86	
Supply and demand shocks[b]	MC4	0.85	
Building and construction regulations[a]	BCR		
Building codes[b]	BCR1	0.71	
Building consents[b]	BCR2	0.74	0.786
Health and safety Act[b]	BCR3	0.72	
Construction contract Act[b]	BCR4	0.74	
External economic environment[a]	EEE		
Economic growth[b]	EEE1	0.83	
Investment tendency[b]	EEE2	0.83	
Credit supply[b]	EEE3	0.82	0.801
Global influences[b]	EEE4	0.80	
Natural majeure[b]	EEE5	0.83	
Building project cost[a]	BPC		
Capital construction cost[b]	BPC1	0.71	
Associated capital cost[b]	BPC2	0.76	0.734
Site acquisition and client's other cost[b]	BPC3	0.66	
Note: CMIN/df=1.789; GFI=0.895; AGFI=0.866; CFI=0.93; RMSE=0.043			
[a] the latent constants; [b] the measurement variables			

5.3. Structural Model and Hypotheses Testing

This study followed the SEM technique to test the proposed hypotheses. The maximum likelihood estimator in Amos 23 was used to estimate the parameters. The SEM approach makes it possible to incorporate the latent variables into the model and take the error term into account during the calculation process [46].

Multiple indicators are modelling as a latent variable set in a structural equation modelling technique providing a theoretical insight into the combined effects of the individual indicators to affect building project cost. The final research model is displayed in Figure 2.
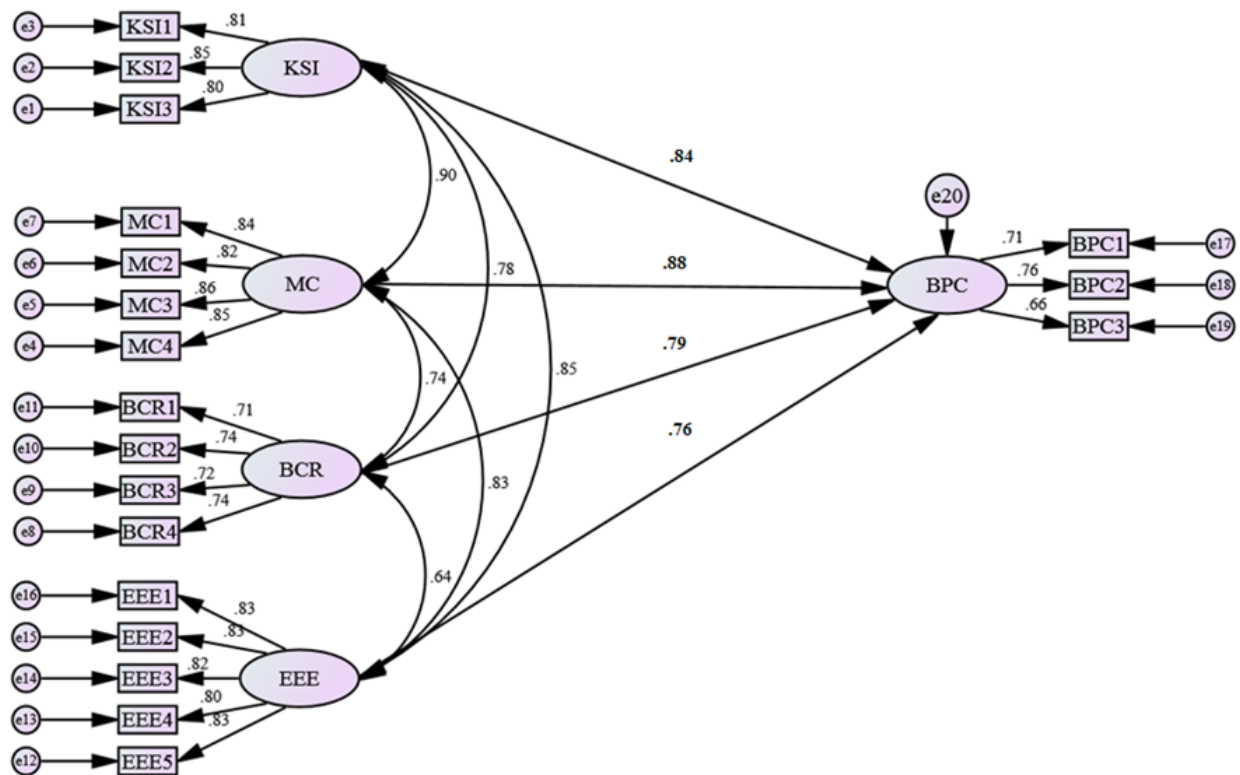
Figure 2.   Final research model

The research model suggested the quantitative effects of the four latent constructs on building project cost through the path coefficients in the model. The results indicated that the market condition construct significantly relates to building project cost (CR=4.451; p<0.001), which indicates H2 is accepted. Moreover, the data reflect a significant effect of stakeholders' influences on building project cost (CR=4.019; p<0.001), so that H1 is also accepted. Finally, the analysis results suggested that building and construction regulation construct (CR=3.841; p<0.001) and external economic environment (CR=3.677; p<0.001) both significantly affect building project cost. Therefore, H3 and H4 are accepted. The hypotheses testing results are shown in Table 5.

Table 5. Hypotheses Testing Results

Hypothesis	Causal relationship	Standardised regression coefficient	CR	Conclusion
H1	KSI→BPC	0.84	4.019	Support
H2	MC→BPC	0.88	4.451	Support
H3	BCR→BPC	0.79	3.841	Support
H4	EEE→BPC	0.76	3.677	Support

Note: Fit statistics: CMIN/df=2.139; GFI=0.906; CFI=0.957; TLI=0.948; RMSEA=0.062

5.4. Reliability and Validity Test

To conduct reliability and validity tests for the observed variables that are used to measure the latent constructs, it is essential for a study to use the quantitative method [47]. Cronbach's alpha can examine the internal consistency of the observed variables [48]. If the value of the Cronbach's alpha is greater than 0.7, reliability is considered to be acceptable [49]. The analysis results indicated the measurement indicators are good measures of corresponding latent constructs as the values of Cronbach's alpha are greater than 0.7; the results are shown in Table 4.

Convergent validity was checked by using average variance extracted (AVE) whereby the overall amount of variance in the measurement indicators is accounted for by the latent construct [50]. The value of the average variance extracted for all the four latent constructs is in the range 0.784 to 0.902, which exceeds the recommended level of 0.5 [51].

Discriminant validity analysis was performed through the squared correlations between the latent constructs. The values of the square correlation are accepted, given that the squared correlation between the latent constructs is less than the AVE of the individual construct. This suggested that the measurement indicators used in this study have adequate discriminant validity. The validity analysis results are shown in Table 6.

Table 6. Correlation Matrix of Latent Constructs

	KSI	MC	BCR	EEE	BPC
Key stakeholders' influences	**0.868**				
Market conditions	0.631	**0.854**			
Building & Construction regulations	0.587	0.652	**0.902**		
External economic environment	0.619	0.633	0.569	**0.806**	
Building project cost	0.608	0.596	0.588	0.682	**0.784**

Note: Diagonal values in bold correspond to the square root of the AVE of the construct, while the matrix represents the square correlation.

6. Result Discussion

This study provided empirical evidence that all four factors, namely key stakeholders' influences, market conditions, building and construction regulations, and external economic environment, have a significant effect on building project costs in New Zealand. The structural model was used to describe and interpret the relationships between the influencing factors and the building project cost. The reliability and validity tests are satisfactory. Moreover, the GOF indices are also acceptable. The hypotheses were also tested by the model. The statistical significance of the path coefficients and the critical ratio (CR) of all the paths confirmed the relationships between building project cost and the influencing factors. The hypotheses are discussed in further detail.

6.1. Hypothesis 1

Key stakeholders' influences have a significant effect on building project cost.

The results of structural equation modelling suggest that the stakeholders' influences construct is significantly associated with the building project cost construct. In other words, the management trying to properly manage and control the building project cost should focus on stakeholders' influences. Therefore, the management can properly manage building project cost by effectively managing the stakeholders throughout the project. Due to the different parties involved in the project having different objectives and interests, it is complex and becomes a significant influencing factor. This finding is supported by the previous study [52] which argued that effective management of stakeholders can improve communication and understanding among parties to avoid litigation

Stakeholders' influences can be valuable contributions, providing insights, knowledge, and support in shaping a construction project from the pre-project brief to project execution. The significant effects of the stakeholders' influences on the building project cost identified in the present study were also confirmed by the findings of [53] in

which client attitudes and leadership were identified as the significant influence factors for project cost performance. Especially, [54], who addressed that stakeholders usually provide and control the resources that ultimately have strong impacts on a project's survival. Therefore, appropriate management of key stakeholders should play an important role in project cost management. In addition, [55] suggested a model can be used to efficiently and effectively manage stakeholders in construction projects. It concluded that the model can include and balance the different interests of diverse stakeholders to smoothly deliver the project.

6.2. Hypothesis 2

Market conditions have significant effects on building project cost.

According to the SEM model, market conditions significantly affect building project cost. This is because construction products are essential necessities, and investment property is highly subject to market change [56]. High volatility is the nature of the construction industry. The cyclical market volatility would influence investment confidence for both suppliers and buyers, and thus induce the price fluctuation [57]. [13] also pointed out that unlike the manufacturing sector; the construction sector is full of small firms which fiercely compete with lower prices that exacerbate the price fluctuations. [58] stated that market price fluctuations can directly affect the entire project cost.

6.3. Hypothesis 3

Building and construction regulations can significantly affect building project cost.

The data analysis showed that the building and construction regulation construct can have a significant effect on building project cost. Regulations such as building codes, building consents, and health and safety Act are all introduced to enhance the building quality or working environment quality in the construction industry. However, the new terms or clauses the industry is required to adopt and adapt are likely to incur cost. In agreeing with this finding, [59] also suggested that the requirement in the building code regarding stronger design and construction, fire safety, a healthier building, and longer service life of building materials can affect the entire project cost through technology, staff training, management, and procurement. Furthermore, [60] also identified that the introduction of a health and safety Act would benefit the construction industry as it has potential to minimize accident rate and reduce the entire project cost. Additionally, risks allocation in a project to a great extent is decided by the selection of contract form and related contract documents [61]. An effective sharing of project risks can improve collaboration among stakeholders and enhance project performance.

6.4. Hypothesis 4

External economic environment has a significant effect on building project cost.

External economic environment constructs were confirmed as one of the key drivers of the building project cost. According to observations and findings from previous studies and research, it is safe to conclude that the main reason for this result might be due to the cyclical nature of the construction industry. As the study conducted by [37, 62], economic growth and investment can influence project cost through the effects of the demand for construction products, for example, a high demand for private housing, public infrastructure, and commercial buildings. In addition to this, credit supply has been highlighted by many studies as a significant factor of building project cost through project financing [36]. Because of the fragmented nature of the construction industry and the limited access to bank credit, demand exceeds supply in the construction industry. Therefore, financial resources significantly contribute to the transitions in the construction industry.

The other finding is that global influence is regarded as key to external economic environment activity for building project costs. The construction industry highly interacts with other industries and has a close relationship with the financial sector. Global influences can affect the construction industry through their effects on the national economy by global trade and global financial institutions [63]. [38] also suggested that imported construction services can directly influence the indigenous construction industry through globalization and financial deregulation. Natural majeure such as earthquake, bushfire, and flooding, etc., can cause a sudden shortage in the supply of housing due to limited building resources, changed building regulations, and increased market conditions outside the disaster zone [39].

7. Conclusions

As effective project cost management is fundamental to construction project success, most of the key industry professionals require a roadmap to estimate and monitor their project cost properly. Therefore, this study developed a roadmap for the key industry professionals by performing an extensive literature review, proposing a research model which shows the relationships between the building project costs and cost drivers, and validating these relationships by using SEM.

The results of this study reveal that the SEM model might be used by the key construction professionals while formulating the most appropriate management strategy based on their construction projects. According to the findings, all four groups of indicators significantly affect project cost. This shows that the managers trying to manage cost properly based on one of these groups should also pay attention to all the categories which form the SEM model. For example, cost management based on stakeholders' influences is not enough for a project; the manager should also appropriately monitor and respond to market conditions, building and construction regulations, and the external economic environment in which the project operates.

The study also suggests that effective cost management requires the contribution and collaboration of all the key stakeholders involved in the project. Furthermore, firms should be aware that they have to make investments in resource management if they want to gain competitive advantages. However, the effects of the management strategies are project specific. The research model is provided to increase strategic cost management.

The developed model empirically described the relationships between the influencing factors and the building project cost. The model can assist the industry professionals to better evaluate the cost drivers. In this context, improved understanding of the drivers of project cost can help management to devise target strategies for cost management, which will ultimately enhance their knowledge and ability to manage their project's cost. The research model not only serves to improve understanding; it also has the potential to be a valuable diagnostic tool in addressing the efficiency and effectiveness of project cost management.

Although the results of this study are difficult to generalise for all construction projects operating globally, similar research and studies can be undertaken using the research model in this study. And the results can serve as a foundation and provide comparisons for other studies and research that used the same methodology and research model from different parts of the world.

The dimensions that are not involved in this study could be taken up as an extension of this study. It is recommended that further examination in terms of developing a structural model should be performed across varied types and sizes of projects at different geographic locations. To this extent, structural equation modelling analysis based on the independent collection of industry data on the specific factors should be carried out to develop the research model and improve the knowledge within the construction management domain.

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