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Factors Influencing Quality of Construction Projects in Cambodia

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Abstract:- The construction industry is a driver of growth in another sector due to its heavy reliance on an extended and varied supply chain. Cambodia as a developing country, the construction industry significantly contributed to the economic development and has created a lot of jobs. The construction becomes one of the important pillars supporting the Cambodian economy. However, construction is also facing many complex issues to challenge foreign companies mostly on quality in construction projects. The quality of construction projects is affected in different ways by various factors. So determining the important factors influencing the quality of construction projects in Cambodia is significant to local Cambodian companies in better quality improvement and also to compete with foreign companies when contracting. The research used a quantitative methodology with 31 sample sizes for the pilot study, 385 sample sizes for the real study with 10 samples for In-depth interviews to confirm the study results. SPSS and AMOS programs were used in this study and the results indicate four important factors for evaluating the quality of construction projects in Cambodia such as avoiding disputes and claims, motivating and empowering employee training, enhancing customer/owner satisfaction, and completing projects on time.

Keywords:- *The Quality of Construction Projects, Cambodian Law on Construction, Construction Quality Management System, Stakeholder Involvement, Project Funding, Construction Materials, Project Management Competence, Project Complexity, and Construction Conflict.*

I. INTRODUCTION

Over the last few decades, the construction industry has increased in size, technology complexity, interdependencies, and variations in demands from clients (Young, 2013). Cambodia's average annual economic growth has been around 7% for the last past 20 years, together with the garment industry, tourism, agriculture, and construction is one of the engines of the growth (AsiaNews.it 2019). Meanwhile, construction project activity in Cambodia has increased significantly in recent years, the construction sector also faced many complex issues that cause a loss of time and money until the legal dispute, construction materials, and building safety problems accumulated over the entire building process. As construction plays an important role in the Cambodian economy, local Cambodian construction companies are still unfortunately plagued by low competitiveness. The lack of competitiveness of local contractors when competing for contracts with foreign companies is mainly due to poor performance and inability to adapt to change, high execution costs, project delays, low levels of efficiency, low productivity, and conflict among involved parties. No scholars yet have evaluated the factors influencing the quality of construction projects in Cambodia; therefore, exploring the factors influencing on quality of construction projects in Cambodia will help Cambodian construction companies gain better quality improvement, and can challenge foreign companies when competing for contracts. The research study focuses on the key factors influencing on quality of construction projects and the main research question in this study is *What are the factors that influence the quality of construction projects?*

II. LITERATURE REVIEW

A. Dependent Variable

Quality in construction projects is not only the quality of products and equipment used in the construction of a facility but also the total management approach to complete the facility (Rumane, 2011), and the fulfillment of the owner's needs based on the scope of works within the budget and schedule (Chung, 1999). Quality in construction has been variously defined as the value of satisfaction of contract specifications (Rumane, 2011; Roberto, & Tomi, 2000; Pyzdek, 1999; Gilmore, 1974; Crosby, 1979), completion of a project with time (Rumane, 2011; Roberto & Tomi, 2000), Enhancing customer/owner satisfaction (Roberto & Tomi, 2000; Parasuraman, Zeithaml, & Berry, 1985), motivation and empower of employees training (Debby, 2011), avoid disputes and claims, and performance-based purposes (Rumane, 2011, Crosby, 1979).

B. Independent Variables

Stakeholder involvement is anyone who has an interest in the process or outcome of a project. The value of stakeholders of projects as a source of information to achieve desired levels of quality (Deming, 1986). Many studies have examined the role of stakeholders in improving project quality within the industry (Tam & Le, 2007). ***H1A:*** *Stakeholder involvement has a significant influence on the quality of construction projects.* A management stakeholder can improve the effectiveness and efficiency of its control and management processes quality management system and as a result, improve project quality (Briner et al., 1997; Yang,

2010). Better management of stakeholders through construction quality management systems improves project quality (Briner et al., 1997; Yang, 2010). ***H1B:*** *Construction quality management systems mediate between stakeholder involvement and the quality of construction projects.*

Project funding refers to the act of providing resources, usually in the form of money or other value such as effort or time (David, 2015). Chan et al., (2002) indicated the effect of project funding on the quality of projects. Evelyn (2017) also indicated project funding affects the construction projects such as cost of funds, source of finance, and adequacy of finances. Jean et al., (2015) found some important factors affecting project quality such as project cost estimation, project technical design, and project implementation time. ***H2A:*** *Project funding has a great impact on the quality of construction projects.* The quality management system in construction is an essential factor to avoid defects in the end product quality (Kim et al., 2018). Many authors witness the beneficial relationship between construction quality management and funding performance (Wruch and Jensen, 1994; Hendricks and Singhal, 1997; Ittner and Larcker, 1997; Easton and Jarrel, 1998; Kumar et al., 2007). In addition, most research emphasized the intermediary role of the different variables between QMS in construction and funding performance (Ana & Andrijana, 2017). ***H2B:*** *Construction quality management systems have a positive interrelation between project funding and the quality of construction projects.*

Construction materials speak to a noteworthy segment of things and project costs, thus it impacts the project quality (Aliverdi, Naeni, and Salehipour, 2013). A recent investigation of the effect of poor quality of construction materials and workmanship on building collapsed in Nigeria (Oke, 2006). Therefore, we can say ***H3A:*** *Construction materials influence the quality of construction projects.* Quality management of materials is consistently performed on project quality (Enshassi, Mohamed, and Abushaban, 2009). Better management of construction material practice through a management system could result in improved project quality (Hwang and Ng, 2013). ***H3B:*** *Construction quality management systems have a positive mediate between construction materials and the quality of construction projects.*

Project management competence is the capability of the project manager in project usage influences the consummation of a project (Olatunji, 2010). Wambugu (2013) stated that lacking project management competence in the supervision and review of work in development extends, as a result of poor project quality. ***H4A:*** *Project management competence influence on the quality of construction projects.* A better quality management system in construction through project management competence could improve the project results (Al-Momani, 2009). Quality management systems help define processes to improve their performance (Kaming et al., 2007). ***H4B:*** *The construction quality management system has a positive mediate between project management competence and the quality of construction projects.*

Project complexity is considered an essential factor in the field of project management. Minh & Yingbin (2019) found that it significantly affects the quality of construction projects. Abdou, Kuan, & Mohammed (2016) explored the five dimensions of project complexity affecting project quality such as environmental complexity, operational complexity, organizational complexity, technical complexity, and team complexity. ***H5A:*** *Project complexity has a significant influence on the quality of construction projects.* An understanding of project complexity and how it might be managed through a quality management system is of significant importance for project managers (José et al., 2018). Sharareh et al., (2016) defined project complexity as the degree of interrelatedness between project attributes and interfaces, and their consequential impact on project quality. Experience suggests that the interrelationship between the project's components is more complex than is suggested by the quality management system rather than the traditional system (Gidado, 1993). ***H5B:*** *Construction quality management system has an interrelation between project complexity and the quality of construction projects.*

Construction conflict when the involvement of multidisciplinary in the construction project also leads to disputes among the parties. It affects construction projects such as project cost, project delay, reduce productivity, loss of profit, and damage to business relationships (Jaffar, Abdul, and Shuib, 2011). Jaffar et al., (2011), Williamson (1979), Cakmak, E., & Cakmak, P.I., (2014) identified three large root causes of dispute that impact the quality project such as behavioral problems, contractual problems, and technical problems. ***H6A:*** *Construction conflict has a significant influence on the quality of construction projects.* Gail (2013) stated that construction law is the rule used to protect the health and welfare of parties, and must be completed when something goes wrong. It is very important when caught up in a construction dispute or situation involving construction defects (Dunlap, 2018). Though construction disputes can be challenging at times, construction law resources provide options to help parties resolve problems that arise to help create a successful project for everyone involved (Dunlap, 2018; Cyril, 2020). In short, construction law plays an important role between conflict construction and project quality. Therefore, the study can draw propose hypothesis that ***H6B:*** *Cambodian law on construction role as mediation between the quality of construction projects and construction conflict.*

C. Mediator Variables

The construction quality management system in construction is a series of coordinated activities that are carried out on a set of elements to achieve the quality of the product or service offered to the customer or user (Veronica & Rocio, 2017). Coffey et al., (2011) stated that the effectiveness of QMS in construction can have an impact on meeting the increasing demand of customers. Mark & Ali (2009) shows some majors affect project quality. In short, the study can state a hypothesis that ***H7:*** *Construction quality management system has an impact on the quality of construction projects.*

Cambodian law on construction: Construction projects often have disputes or conflicts among involved parties that results in litigation as a result of project quality in the claim (Dunlap, 2018). Dunlap (2018) also stated that construction law is very important when caught up in a construction dispute or situation involving construction defects that affect the project quality. And the law relating to construction disputes is a significant effect on the quality of the final project when handover projects such as completion with time, and disputes on claims (Cyril, 2020). Nate (2019) added that disputes in construction aren't cheap. In Cambodia, many factors affect the quality of construction projects related to the new law on construction which was promulgated on November 2019. The new law on construction aim to determine the principles of building technical regulations, rules, and procedures for the management of the construction sector in Cambodia. To be qualified based on Cambodian law on construction, every construction must follow two main important rules such as technical regulations, and management procedures.

III. METHODOLOGY

A. Introduction

This study used a quantitative method to collect primary data. Only relevant data was gathered from top management of construction companies, contractors, country inspectors, project owners, site engineers, sub-contractors, etc. who currently work at sites located in Phnom Penh, Cambodia. The source of data collected is only from local Cambodian construction with anonymous and confidential for all respondents. However, before starting the full survey, the pilot study represents a fundamental phase of the research process. The purpose of conducting a pilot study is to examine the feasibility of an approach that is intended to be used in a larger-scale study (Andrew et al., 2010). By Brwone (1995) the pilot sample size is at least 30 or greater to estimate a parameter. In this study, 31 sample size was selected. After the pilot study, a full-scale survey of respondents is conducted. The total population base on BEC (2019) is 4014, by Daniel (1999) using 95% of reliability with a 5% of error margin, we got 351 sample size for full-scale. However, 397 samples were selected to avoid non-usable response and non-response bias tests. The data collection of the 397 respondents used SPSS and AMOS programs to analyze and divided into three parts. The first part is about descriptive statistics and the second part is about CFA and SEM tests. And lastly, about mediator testing.

B. Mediators Testing

To test mediators, Baron & Kenny (1986) introduced two types of mediators. Once in full mediation is when the entire relationship between the IV and DV is through the mediator variable. But if we take away the mediator, the relationship disappears. Baron and Kenny (1986), Judd and Kenny (1981), and Jame and Brett (1984) outlined four steps to identify the mediation hypothesis. If the four steps are met then the M is said to completely mediate the IV(X), and DV(Y) relationship.

- *Step 1*: show that the independent variable (X) is correlated with the mediator (M)
- *Step 2*: show that the dependent variable (Y) is correlated with the mediator (M).
- *Step 3*: demonstrate a full mediator on the process. The effect of X on Y, controlling for M.

➢ *In Step 3, Three Regression Models are Needed to be met in the result to Support full Mediation.*

- *1st regression*: X as the predictor variable shown to significantly influence the mediator variable M.
- *2nd regression*: X as the predictor variable shown to significantly influence the dependent variable Y.
- *3rd regression*: M must significantly influence the dependent variable in the regression. Here, the IV and M are entered as predictors.

C. Factor Analysis

Factor analysis is used to uncover the latent structure of a set of variables. It reduces attribute space from a larger number of variables to a smaller number of factors. Confirmatory factor analysis (CFA) uses to validate the aspect structure of a fixed of observed variables and loading scale items on factors are tested and removed if the regression weight is smaller than 0.5 and divided into two steps:

➢ *Step 1*: CFA is performed for every recognized factor of the measurement model.
➢ *Step 2*: CFA is performed for the entire factor to evaluate the model.

Some criteria need to be adequacy to fit the model and its interpretations as the following:

Table 1 Keywords and Value Acceptance & its Interpretation

Acronym	Explication	Accepted if	Reference
Likelihood	P-Value	≥ 0.05	Joreskog & Surbon (1996)
CMIN/DF	Chi-square divided by degree of freedom	≤ 3 = acceptable fit ≤ 5 = reasonable fit	Kline (1998); Marsh & Hocevar (1985)
GFI	The goodness of Fit Index	1 = Perfect fit ≥ 0.95 = Excellent ≥ 0.90 = Good > 0.80 = Acceptable	Kline (2005); Hu & Bentler (1998); Steiger (1990); Hooper et al. (2008)
CFI	Comparative Fit Index	1 = Perfect fit ≥ 0.95 = Excellent ≥ 0.90 = Good > 0.80 = Acceptable	West et al. (2012); Fan et al. (1995); Steiger (1990); Hooper et al. (2008)
RMSEA	Root Mean Square Error of Approximation	> 0.10 = Poor < 0.10 = borderline fit < 0.08 = acceptable fit ≤ 0.05 = excellent fit	MacCallum et al (1996); Steiger (1990); Hooper et al. (2008)

D. In-Depth Interview

After getting the results from the analysis, the confirmation of the results is checked whether the overview from the response is the same as what the study revealed or not. An In-depth interview is used to confirm the result. It is a qualitative research technique that involves exploring their perspectives on particular ideas (Carolyn & Palen, 2006). Six steps were introduced for conducting an In-depth interview as the following: step 1 - prepare a plan, step 2 - develop instruments, step 3 - train data collectors, step 4 - collect data, step 5 - analyze data, and last step - disseminate the findings. In this study, we selected 10 respondents with integrity in recruiting to confirm the result.

IV. DATA ANALYSIS AND INTERPRETATIONS

A. Introduction

The pilot study of 31 samples was selected to validate the scale and items inappropriately for primary validity and reliability. The test showed satisfactory both validity and reliability of all construct measurements. A full-scale survey with 385 samples using Five Point Likert Scales was divided into sex, skill, education level, working experience, project role, and company type. In addition, the full test showed satisfactory both validity and reliability. The Cronbach's alpha value in general is 0.973 which is high.

Three tests before CFA need to be done such as the Non-response bias test, the Normality test, and the Common method bias test.

The non-response bias test causes the sample to be unrepresentative of the population as a whole. If the P-value is over 0.05 then we can say that Non-response bias does not exist. The test concludes that Non-response bias is not a concern for this sample study. It means these data should accurately reflect the opinion of the respondent as a whole.

The normality test is very important to measure the central tendency and dispersion (Asghar & Sale, 2012). For datasets small than 2000 sample sizes, the Shapiro Wild test is selected using a skewness value between -3 to +3, and a kurtosis value between -10 to +10. The result concludes the data retain the null hypothesis which means that the data of the study is normally distributed. In addition, all value of skewness is less than -1 which means the distribution is highly skewed to the right.

The common method bias test occurs when the estimation of the relationship between two or more constructs is biased because they are measured with the same method (Podakoff & Organ, 1986). In this study, the extraction of squared loadings of variance in a percentage equal to 31.94% which is less than 50% means no problem with CMB in the data of the study.

B. Factor Analysis

The first step of FCA is performing for every recognized factor of the measurement model and we drop some factors whose regression weight is less than 0.5 as shown.

Table 2 Summary Result of CFA Individual

No	Variables	Construct Measurement before Analysis	Construction Measurement after Analysis	CFI	GFI	RMSEA	Status
1	Stakeholder Involvement	7	3	1.00	1.00	--	perfect
2	Project Funding	9	3	1.00	1.00	0.462	poor
3	Construction Materials	5	4	0.965	0.988	0.097	excellent
4	Project Management Competence	7	6	0.913	0.950	0.126	good
5	Project Complexity	19	11	0.903	0.900	0.114	good
6	Construction Conflict	19	17	0.872	0.837	0.101	acceptable
7	Construction Law	9	7	0.820	0.877	0.173	acceptable
8	Construction Quality Management System	10	9	0.937	0.921	0.105	good
9	Quality of Construction Projects	6	6	0.913	0.950	0.123	good
		91	**66**				

After every recognized factor of the measurement model is done, CFA is performed for the entire factor to evaluate the model. Two models were tested in this study.

- *Model 1: X-M-Y (M as Construction Quality Management System)*

Table 3 CFA Model 1

	Model 1	Factors	Constructs	CMIN/DF	GFI	CFI	RMSEA	Model Status
1	Initial Model Results	7	42	4.472 ≤ 5 OK	0.687 < 0.8 NO	0.730 < 0.8 NO	0.095 < 0.10 OK	unacceptable
2	2nd Model Results	7	41	4.520 ≤ 5 OK	0.691 < 0.8 NO	0.735 < 0.8 NO	0.096 < 0.10 OK	unacceptable
3	2nd Model Refined	7	41	3.994 ≤ 5 OK	0.746 < 0.8 NO	0.788 < 0.8 NO	0.088 < 0.10 OK	unacceptable
4	Final Refined Model Results	7	38	3.847 ≤ 5 OK	0.803 > 0.8 OK	0.814 > 0.8 OK	0.086 < 0.10 OK	acceptable

- *Model 2: X-M-Y (M as Cambodian Law on Construction)*

Table 4: CFA Model 2

	Model 2	Factors	Constructs	CMIN/DF	GFI	CFI	RMSEA	Model Status
1	Initial Model Results	3	30	5.418 > 5 NO	0.719 < 0.8 NO	0.732 < 0.8 NO	0.107 > 0.10 NO	unacceptable
2	2nd Model Results	3	27	5.348 > 5 NO	0.748 < 0.8 NO	0.769 < 0.8 NO	0.106 > 0.10 NO	unacceptable
3	Final Refined Model Results	3	27	4.420 ≤ 5 OK	0.811 > 0.8 OK	0.831 > 0.8 OK	0.094 < 0.10 OK	acceptable

These two models showed acceptable based on the criteria as shown in the figure above.

Before start testing SEM, the reliability and validity of the model measurement need to check. To satisfy the reliability of model measurement, the value of compound reliability (CR) must be greater than 0.7.

Table 5 Compound Reliability Value and its Acceptance

ID	Factor	Σ(Load)² (A)	Σ(Error) (B)	C.R A/(A+B)	Status
1	Stakeholder	3.54	0.84	0.81	OK
2	Project Funding	5.51	0.77	0.88	OK
3	Construction Materials	3.08	0.79	0.80	OK
4	Project Management Competence	9.73	1.74	0.85	OK
5	Project Complexity	60.76	3.83	0.94	OK
6	Construction Conflict	132.83	6.08	0.96	OK
7	Construction Law	10.73	1.77	0.86	OK
8	Construction Quality Management System	41.87	2.68	0.94	OK
9	Quality of Construction Projects	10.13	1.41	0.88	OK

The table above shows satisfactory component reliability with the value of C.R value bigger than 0.7

Another test is the validity of model measurement. The validity of model measurement is divided into two parts.

- *Convergent validity* refers to the correlation between responses of different variables in assessing the same construct. The validity must be greater than or equal to 0.5 for its average value (Hamid et al., 2017; Engellant et al., 2016; Sujati, 2020). The result of convergent validity of model measurement of the 9 variables shows acceptable for the ultimate refined measurement model.

- *Discriminant validity* or divergent validity of model measurement refers to the degree to which the measures that should not be very highly correlated with each other are distinct. If the correlation value between the two constructs is less than the square root of the convergent validity value; so discriminant validity exists (Engellant et al., 2016). After testing, some items need to eliminate to validate the divergent validity. After the elimination, the discriminant validity is satisfied and the value of correlation is better and acceptable.

The last of the model test in SEM is the value of variance which is calculated by the Square multiple correlations associated with the dependent variable, and the value of SMC (R) is at least 0.5 and ideally 0.7 (Xia et al., 2015), and the value lower than 0.25 should remove (Hair, Babin, & Anderson, 2019).

Table 6 Squared Multiple Correlation Value

Dependent Variables	Independent Variables	Squared Multiple Correlation (R)
Construction Quality Management System	Stakeholder Involvement Project Funding Construction Materials Project Management Competence Project Complexity	0.859
Construction Law	Construction Conflict	0.606
Quality of Construction Project	Stakeholder Involvement Project Funding Construction Materials Project Management Competence Project Complexity Construction Conflict	0.835

The table above shows the squared multiple correlations values bigger than 0.5 which are all accepted. This means the hypothesis of the study can conduct accurately. The P-value of the SEM model must be less than 0.05 to be considered significant, and partially significant when the P-value is between 0.05 to 0.10.

Table 7 P-Value of SEM Results

			Estimate	S.E.	C.R.	**P-value**	Label
F6	<---	*F1*	*-.021*	*.051*	*-.420*	*.675*	*par_33*
F6	<---	F2	.168	.029	5.731	***	par_34
F6	<---	F3	-.259	.055	-4.682	***	par_35
F6	<---	F4	.257	.045	5.658	***	par_36
F6	<---	F5	.654	.048	13.500	***	par_37
F9	<---	F8	.887	.068	13.069	***	par_43
F7	<---	*F1*	*.126*	*.071*	*1.776*	*.076*	*par_38*
F7	<---	F2	-.284	.058	-4.855	***	par_39
F7	<---	F3	.495	.109	4.534	***	par_40
F7	<---	F4	.276	.086	3.223	.001	par_41
F7	<---	F5	-.318	.159	-1.998	.046	par_42
F7	<---	*F8*	*.116*	*.071*	*1.639*	*.011*	*par_44*
F7	<---	F6	1.029	.237	4.338	***	par_45
F7	<---	*F9*	*-.050*	*.065*	*-.777*	*.086*	*par_46*

Based on the result of the model SEM, we obtain the P-value and t-value (C.R.) as shown in the table above and the final model SEM as shown in the figure below.

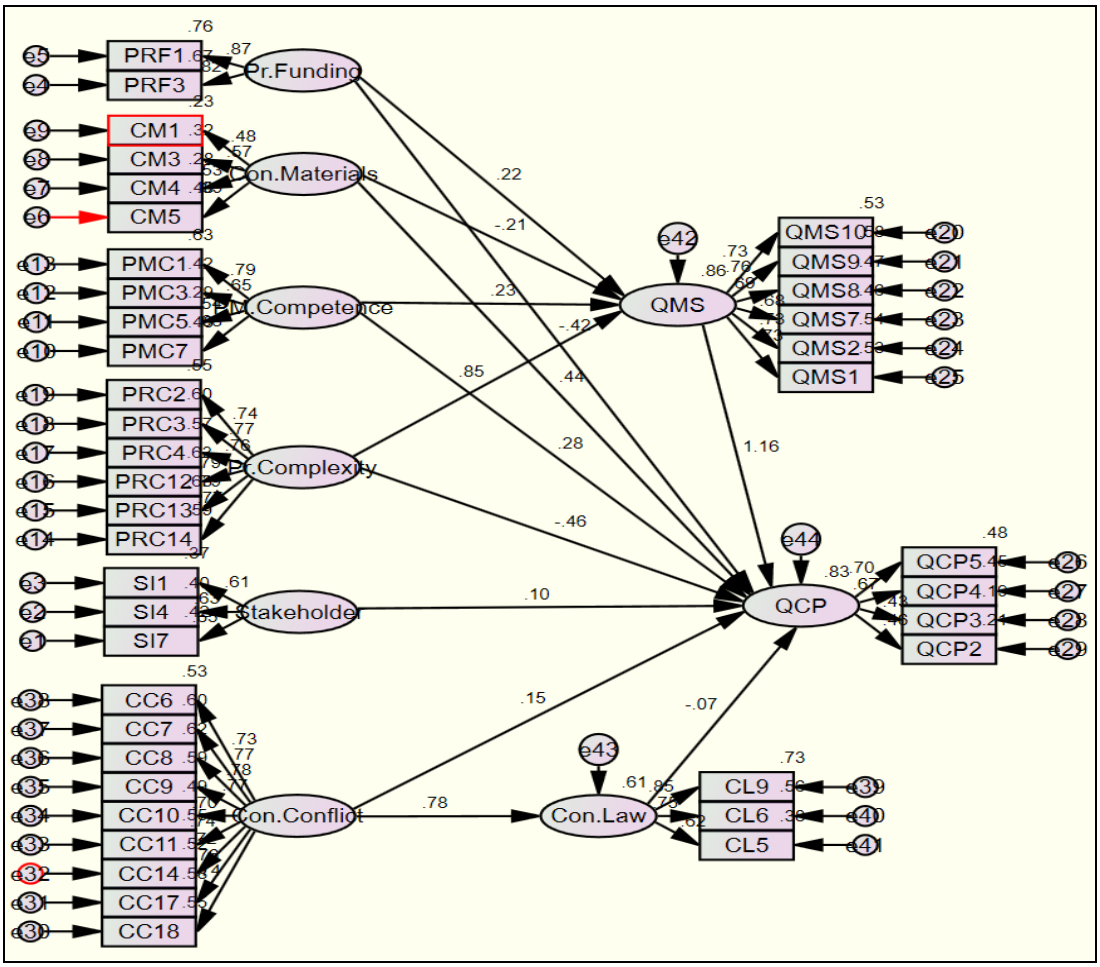

Fig 1 Final Model SEM after Hypothesis Testing

➢ *The Findings can State the Hypothesis as the following:*

- *Stakeholder Involvement:*

✓ *H1A*: Stakeholder involvement has a partially significant influence on the quality of construction projects. (P-value, 0.076 for 95%, or 0.065 for 90%)
✓ *H2A*: The construction quality management system doesn't play a role as a mediator between stakeholder involvement and the quality of construction projects. (P-value, 0.675 > 0.05)
✓ *Project Funding:*
✓ *H2A*: Project funding greatly impacts the quality of construction projects. P-value (*** < 0.05)
✓ *H2B*: The construction quality management system functions as a full mediation between project funding and the quality of construction projects. P-value (*** < 0.05)
✓ *Construction Materials:*
✓ *H3A*: Construction materials influence the quality of construction projects. P-value (*** < 0.05)
✓ *H3B*: The construction quality management system functions as a partial mediation between construction materials and the quality of construction projects. P-value (*** < 0.05)
✓ *Project Management Competence:*
✓ *H4A*: Project management competence influence the quality of construction projects. P-value (*** < 0.05)
✓ *H4B*: The construction quality management system functions as a partial mediation between project management competence and the quality of construction projects. P-value (*** < 0.05)
✓ *Project Complexity:*
✓ *H5A*: Project complexity has a great significant influence on the quality of construction projects. P-value (0.046 < 0.05)
✓ *H5B*: The construction quality management system functions as a partial mediation between project complexity and the quality of construction projects. P-vale (*** < 0.05)
✓ *Construction Conflict:*
✓ *H6A*: Construction conflict has a partially significant influence on the quality of construction projects. P-value (0.01 < 0.05)
✓ *H6B*: The Cambodian law on construction functions as a partial mediation between construction conflict and the quality of construction projects. P-value (*** < 0.05)
✓ *Construction Quality Management System:*
✓ *H7*: Construction quality management system has a great significant influence on the quality of construction projects. P-value (*** < 0.05)
✓ *Cambodian Law on Construction:*
✓ *H8*: Cambodian law on construction has a partially significant influence on the quality of construction projects. P-value (0.05 < 0.086 < 0.10)

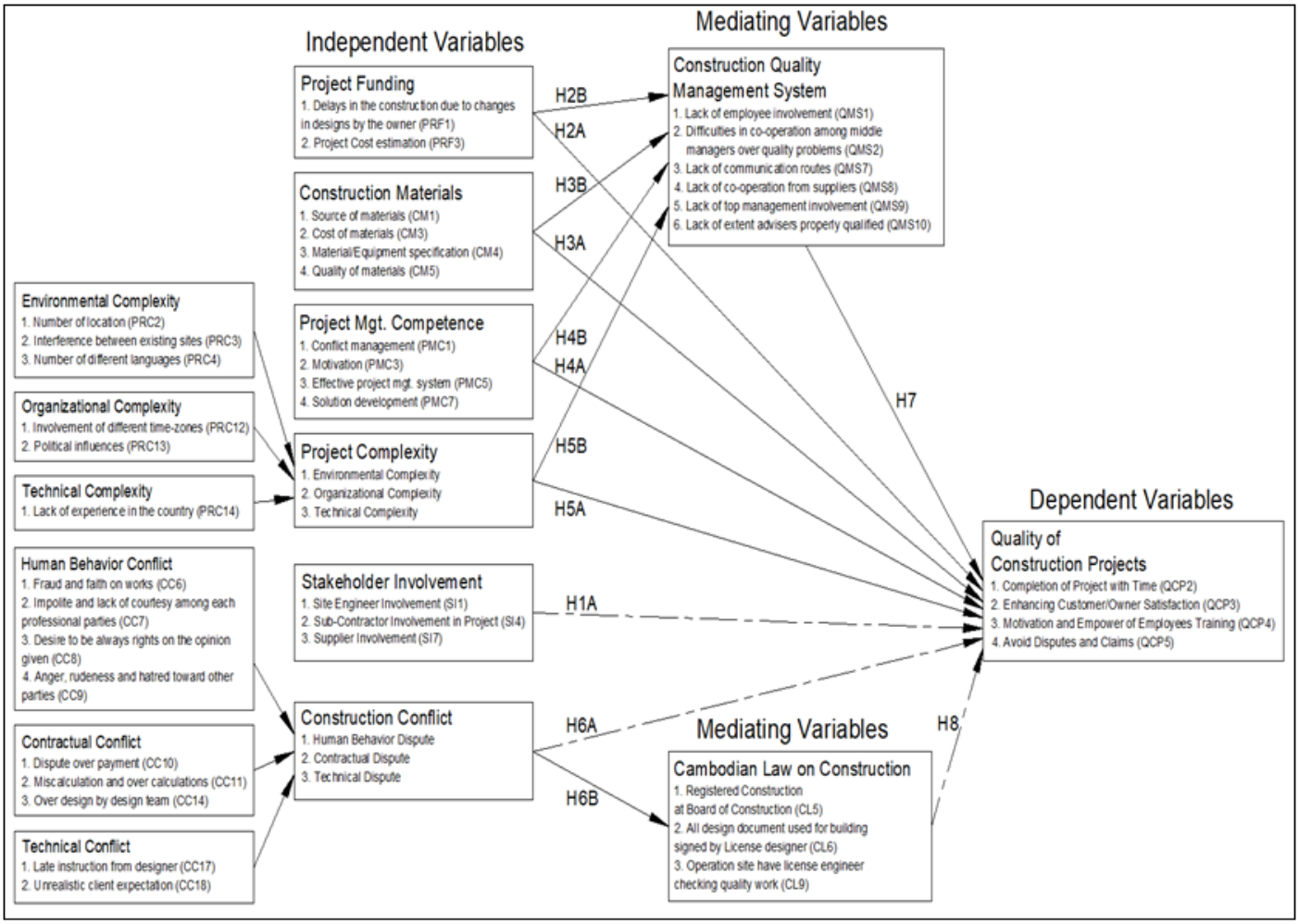

Fig 2 Final Model Framework of the Study

C. Mediator Test

Primarily, we already test the mediator before we can include the two mediators into the CFA and SEM model, but since we drop many items during CFA analysis and discriminant validity of model measurement. So we need to recheck the mediators.

➢ *Cambodian Law on Construction*

- *Step 1*: X positive moderate correlation to M (r-value + 0.644)
- *Step 2*: Y positive moderate correlation to M (r-value + 0.504)
- *Step 3*: Three regression model
- *1st regression*: X of M: P-value < 0.05 significant
- *2nd regression*: X of Y: P-value < 0.05 significant
- *3rd regression*: X&M of Y: P-value < 0.05 significant

So, Cambodian law on construction partially mediates the X-Y relationship and the direction of the relationship is a positive effect.

➢ *Construction Quality Management System*

- *Step 1: X is a correlation to M*
- *Project funding & M (r-value +0.588)*
- *Construction materials & M (r-value +0.265)*
- *Project management competence & M (r-value +0.695)*
- *Project complexity & M (r-value +.838)*
- *Step 2: Y positive moderate correlation to M (r-value + 0.654)*
- *Step 3: Three regression model*
- *1st regression: X of M: P-value < 0.05 significant*
- *2nd regression: X of Y: P-value < 0.05 significant*
- *3rd regression: X&M of Y: P-value*
- *Project funding: P-value (0.520) > 0.05 insignificant*
- *Construction materials: P-value < 0.05 significant*
- *Project management competence: P-value < 0.05 significant*
- *Project complexity: P-value < 0.05 significant*

In conclusion, the construction quality management system (M) completely mediates the project funding and the quality of construction projects. While the construction quality management system (M) role partially mediates between X-Y relationship.

D. In-Depth Interview

Lastly, after getting results from the quantitative analysis, confirmation needs to be conducted. In an In-depth interview with 10 respondents, the results show that all participants agreed with the constructions we found and most respondents agree with the order of influence weight on each factor. In addition, they all strongly support the construction quality management system and Cambodian law on construction role as the mediation between the Independent and Dependent variables. Thus, the result of the in-depth interview strongly supports the results of the study.

V. DISCUSSION

Based on the studies, all independent variables have positive significant support for the dependent variables. It means when we improve stakeholder involvement, project funding, construction materials, project management competence, project complexity, and construction conflict in construction projects can achieve the desired level of quality in construction projects. In contrast, the results also show the two mediators have significant negative support for the dependent variables. This also means that when improving the construction quality management system and Cambodian law on construction, they do not improve the quality of construction projects. The findings also have many previous authors' support such as Landin (2000) who argued the effectiveness of QMS in construction for improving the quality of construction projects since the QMS is difficult to apply by construction companies because the processes are too general. In addition, Turk (2006) also argued the effectiveness of QMS in construction takes a long time to integrate into the construction management system and the operation costs would be high which affects the quality of construction projects.

VI. CONCLUSION AND RECOMMENDATIONS

There have four important factors that contribute to the quality of construction projects with less to high impacts as the following: completing the project on time, enhancing customer/owner satisfaction, motivating and empowering employees' training, and avoiding disputes and claims.

The researcher would like to recommend achieving the desired level of quality for construction projects. Local construction companies should avoid disputes and claims in construction, motivate and empower employee training, complete the project with time, enhance customer satisfaction, and the effectiveness of the construction quality management system should apply to the appropriate construction site to get their effectiveness and depends on the range planning of construction sites. For government, should do the following: (1) all construction projects should register with the Board of Construction. (2) all design documents used for the building should be signed by a licensed designer, and (3) all operation sites should have a licensed engineer checking the quality of work at the site. Moreover, requesting a licensed designer sign in every document would cost much, and also requesting a licensed engineer to check the quality of work would spend much. Therefore, the Ministry of Land Management should reconsider how big the construction should need a licensed engineer/designer to sign or to check quality both on the document and on the site operation.

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