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The Effect of Cash Flow Variation on Project Performance: An Empirical Study from Kuwait

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Abstract

Despite the relationship between cash flow, financial management, and project performance, no study examined the mediating role of financial management on the relationship between cash flow and construction project performance, especially in Kuwait. The goal of this study was to examine the impact of cash flow fluctuations on construction project performance, as well as the role of financial management in mediating this relationship. To accomplish these goals, the researcher employed a descriptive-analytical method to create a questionnaire of 31 items. The study's sample was chosen at random and includes (181) project managers and firm owners from contractors' companies in Kuwait. The study found a statistically positive and significant effect of cash flow variation on project performance from the perspective of Kuwaiti contractors at the significance level (0.05), as well as a mediated role of financial management in the relationship between cash flow variation and project performance. The research came up with a number of recommendations based on the findings, including the need for contractors to have a better understanding of cash flow to arrange project activities correctly and efficiently. Further studies may be included into the effect of cash flow forecasting (planning) and financial management (control) on various construction activities.

Keywords: Cash Flow Variation, Construction, Project Performance, Financial Management

JEL Classification Code: G3, G34, M40, O16

1. Introduction

Construction is an important part of the economy because it produces jobs, stimulates economic growth, and handles environmental and energy issues. Furthermore, the construction industry has both direct and indirect ties with other industries, enhancing its impact on economic growth and prosperity beyond its direct contribution to construction operations (Zraqat, 2019).

Construction project management is concerned with the environment and characteristics of a project to ensure that events occur in accordance with the plans and standards. Nonetheless, performance dissatisfaction is a prevalent issue in the construction industry. A typical project may face a number of challenges that obstruct its success, such as low productivity. Other building issues emerge from the industry's long history of time and cost overruns (Al-Beshtawi et al., 2014). Despite the implementation of new alternative and less aggressive contractual frameworks, Yisa and Edwards (2002) agree that project time and expense overruns continue to plague the firm, resulting in client discontent.

A construction company's failure is mostly due to a lack of money to fund day-to-day operations (Zayed & Liu, 2014; Doan et al., 2021). Failure is unfavorable for any business and must be avoided at all costs because its consequences extend beyond the contracting organization, which affects the construction sector as well as the whole society. Besides that, cash seems to be the most valuable resource in construction firms, so cash flow should be the most important managerial factor (Omopariola et al., 2019).

The most difficult and critical challenge currently facing contractors, according to Weber (2018), is securing sufficient cash flow at all stages of construction project implementation, where sufficient cash flow aids in meeting three goals: paying for overhead, labor, and material costs; completing construction activities on time; and reducing

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finance liabilities. As a result, contractors avoid doing work that exceeds available cash or credit at any time during the project (Hussien et al., 2017; Zraqat et al., 2021).

Furthermore, construction projects are known for their high complexity and general lack of control, which increases their risk due to high execution costs. Poor financial management of these projects, such as failure to pay outstanding payments on time, may cause delays in completion and, as a result, failure to meet economic feasibility, resulting in significant financial losses for the owners. As a result, it is vital to have a prior grasp of the real cash flow values required during the construction phases (Kotb et al., 2018).

It should also be highlighted that the project financial cash flow curve is the primary tool utilized by any financial management department to estimate the actual cash flows due for a project during the implementation phase (S-CURVE). However, the S-CURV project, which was started at the beginning of the project, does not reflect the true or genuine amounts owed (Hussien et al., 2021). It depicts the planned work on site without taking into account any actual changes in the work or materials on hand, and so does not represent the actual cash flow required by the financial management department to satisfy the progress payment certificate deadline (Zayed & Liu, 2014).

Implementing a sound financial management plan is beneficial to successful construction businesses. According to Tengan et al. (2016), the success of any construction project is highly dependent on the level of (financial) resources, organizational performance, and appropriate financial management strategies, as well as the project completion time and managerial input of the relevant players involved. As a result, the current study aims to look into the function of financial management as a mediating factor in the relationship between cash flow variation and construction project success.

2. Research Background

Performance is a significant concern for construction projects managers because the successes of construction projects confront numerous problems during all its stages up to the delivery stage. Therefore, many project management researchers have looked into critical success factors in construction projects (Abidin et al., 2021; Gunduz & Almuajebh, 2020; Tripathi & Jha, 2018; Maghsoodi & Khalilzadeh, 2018; Liu et al., 2016). However, due to differences in expectations of project success among stakeholders of multiple projects in a project, the concept of project success and performance indicators remains vague. As a result, there is a vacuum in understanding all essential aspects that affect project performance when assessing project stakeholders' perceptions of success.

Construction firms are a more difficult profession due to the many risks that cause project failure than other industries. In addition, due to the construction firms' growth and capital investment cycles, numerous variables in management, financial aspects, and cash flow are convergence together and affect the project performance (Shahhossein et al., 2017).

Despite the relationship between cash flow, financial management, and project performance (Purnus & Bodea, 2015, 2013; Kotb et al., 2018; Shash & Al Qarra, 2018; Omopariola et al., 2019; Zraqat, 2020), no study examined the mediating role of financial management on the relationship between cash flow and construction project performance, especially in Kuwait (within the limits of the researcher's knowledge). Therefore, the lack of such studies considers a research gap that requires more research to identify and examine this relationship to fill the theoretical and practical gap about this relationship.

Based on the above scenario, there is a gap in studying the effect of cash flow variation on construction project performance considering the mediating role of financial management. The major contribution of this paper is to examine the mediating role of financial management on the relationship between cash flow variation and project performance. This study is different from the others in the literature because it considers the effect of financial management on project success.

This contribution would result in a suitable allocation of limited project resources such as money, manpower, and equipment. This contribution would lead to improving construction financial management practices. The discussion of results provided the construction industry in Kuwait with recommendations based on identifying the relationship among the study variables (cash flow variation, project performance, and financial management).

The current research aims to achieve the following objectives:

1. Examine the effect of cash flow variation on construction project performance from the point of view of contractors in Kuwait.
2. Examine the effect of cash flow variation on financial management from the point of view of contractors in Kuwait.
3. Examine the mediating role of financial management on the relationship between cash flow variation and construction project performance from the point of view of contractors in Kuwait.

3. Literature Review and Hypotheses Development

This section highlights the results of the studies conducted to examine the relationships between the study

variables, and based on the discussion of those studies, the researcher developed and presented the research model and its hypotheses.

3.1. Cash Flow and Project Performance

Cash flow has an impact on every aspect of the construction project implementation process. A lack of funds can lead to project and business failure. Researchers have looked into cash flow in the context of scheduling, project delays, business failure, and forecasting (Al-Joburi et al., 2012). Furthermore, contractors that do not adequately manage their cash flow will be unable to compete in the building industry. A lack of money, according to research and investigations, is a primary cause of building project failure (Zayed & Liu, 2014).

Contractors must compare actual income and expenses to predicted values during the construction process. If these figures change, the contractor should adjust the schedule and update the project plan as soon as possible to accommodate the new situation. If the contractor had a solid understanding of cash flow forecasting, they could manage cash flow more efficiently and correctly during the construction process, avoiding unnecessary expenses and project failure (Zavadskas et al., 2013).

A variety of methods have been used to investigate cash flow. Non-mathematical approaches, sometimes known as project-oriented forecasting models, were commonly utilized in conventional research (Tim et al., 2015). These forecasting models were used to track and adjust the project's progress, as they were constructed using earlier project data. The models were used to forecast construction costs, and they offered a comprehensive explanation of the origin and nature of the forecast (Sharifi & Bagherpour, 2016).

Previous studies (Djatmiko, 2017; Purnus & Bodea, 2016, 2015, 2013; Mahmoud et al., 2021) indicated that there is a relationship between cash flow variation and project performance. Based on what was discussed, the researcher proposed the following hypothesis:

H1: *There is statistical significance direct impact of cash flow variation on project performance from the point of view of contractors in Kuwait.*

3.2. Cash Flow and Financial Management

Most construction firms create financial projections based on the project's projected financial performance, taking into account some key assumptions like time frame (financial projections cover the project implementation period as well as three to five years after completion), capital outlays, and financing costs (they include any up-front and ongoing capital needs d (Purnus & Bodea, 2016).

Net present value (NPV) and internal rate of return are two of the most often used measures for predicting a project's predicted financial performance (IRR). Financially, a project with a positive net present value (NPV) is appealing. If a project's net present value (NPV) is negative, it will almost certainly create negative cash flow or not enough cash to cover inflation and the target return. The IRR is the required discount rate to get a zero NPV. The higher the IRR of a project, the more enticing it is financially. In addition to the NPV and IRR, other metrics such as the payback period, the weighted average cost of capital, and terminal value are utilized (Sebestyen & Toth, 2015).

However, many studies analyzing large numbers of construction projects (Czarnigowska & Sobotka, 2013; Magnussen & Olsson, 2006; Purnuş & Bodea, 2013; Sebestyen & Toth, 2015) revealed that approximately 70% of the projects were completed with significant differences between estimated and actual costs. As a result, it is questionable to consider planned costs as an independent variable when planning construction time. Furthermore, because the projects are being implemented in different locations and at different times, the costs must be made comparable for any statistical time–cost model.

Previous studies (Abdul-Rahman et al., 2009; Shahhossein et al., 2017; Purnus & Bodea, 2015) indicated that there is a relationship between cash flow variation and financial management. Based on what was discussed, the researcher proposed the following hypothesis:

H2: *There is statistical significance direct impact of cash flow variation on financial management from the point of view of contractors in Kuwait.*

3.3. Cash Flow, Financial Management and Project Performance

A firm can survive a transitional period without earning a profit or even losing money, but it will eventually fail to owe to a lack of cash flow, according to Tim et al. (2015). In addition, as compared to other businesses, the construction industry has a high percentage of insolvencies. According to the findings of several writers (James et al., 2010; Omopariola & Windapo, 2019), cash flow concerns and inadequate financial management are the major reasons for failure in the construction industry.

Project delays are a common occurrence in the construction industry. Many scientists have attempted to determine what is causing it. According to Abdul-Rahman et al. (2009), there are four major causes of construction delays, all of which are related to money: Late payments, poor cash flow management, a lack of financial resources, and financial market volatility are all elements to think about.

Also, by controlling the financial positions, the project cash flow (PCF) serves as a foundation for the contractor to make suitable decisions for project continuity and success (positive or negative balance). The cash comes from current assets (self-funding), loan funds, and down payments. Direct costs, indirect expenditures, contractor profit, and informal costs are all included in the cash out (Reyers et al., 2015). Figure 1 depicts the components of construction project costs.

Previous studies (Omopariola & Windapo, 2019; Gunduz & Almuajebh, 2020; Kotb et al., 2018) indicated that there is a relationship between cash flow variation, owner financial management, and project performance. Based on what was discussed, the researcher proposed the following hypothesis:

H3: *There is mediating role of financial management on the relationship between cash flow variation and project performance from the point of view of contractors in Kuwait.*

4. Methodology

Quantitative research, or number-crunching, references the accurate appearance of social wonders using quantitative ways. Quantitative research focuses on developing and utilizing numerical models, hypotheses, and questions about miracles. The estimation procedure is at the heart of quantitative research because it serves as a vital link between experimental perception and the scientific expression of quantitative relationships (Sekaran, 2010).

This study used the descriptive analytical approach to gather data from the study sample, referring to theoretical literature connected to the issue of the study and designing a questionnaire as the main tool to collect data.

4.1. Research Respondents

The respondents of the current study are all project managers and company owners from contractors' companies who operate within Kuwait, which total about (340) construction companies, where the reasons for choosing the respondents stem out from the individuals most affected by this issue. Also, the researcher considered the significant information that can be collected from this population.

4.2. Research Sample

According to the rules presented by Krejcie and Morgan (1970) for sample size decisions, the required sample size for this investigation was around (173), as indicated in equation 1. According to Leveugle (2009), the study sample consisted of (191) persons with a 95 percent confidence level and a +/–5 percent margin of error in case of unusable data.

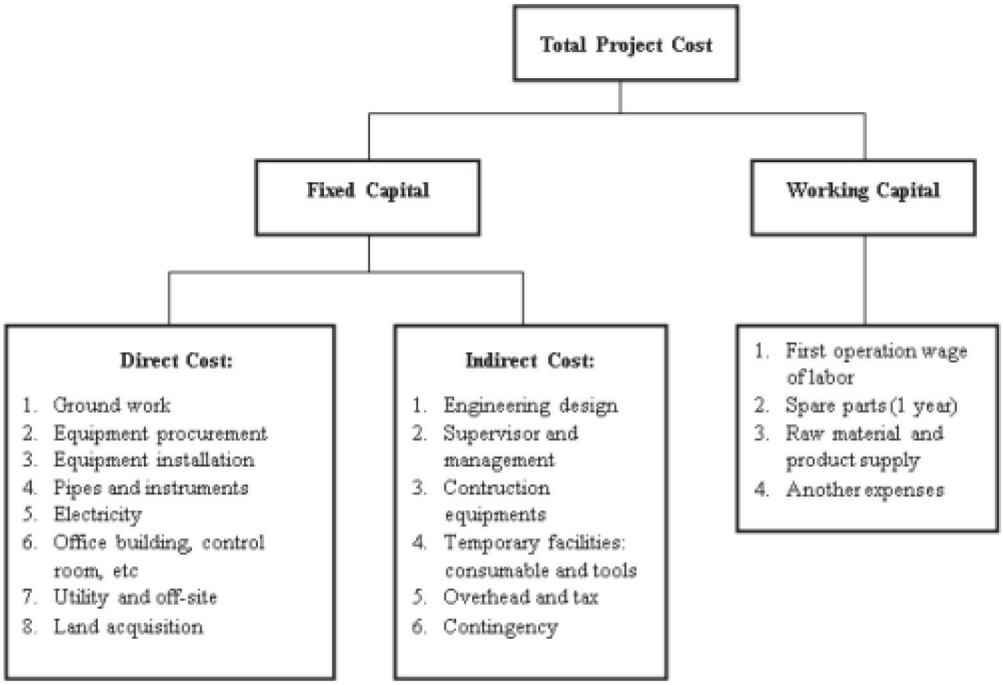

Figure 1: Total Construction Project Costs; Source (Djatmiko, 2017)

$$n = \frac{x^2 * N * P(1-P)}{(\mathrm{ME}^2 * (N-1) + (x^2 * P * (1-P))} \quad 1$$

Where:

n = sample size.
X^2 = Chi-square for the specified confidence level at 1 degree of freedom.
N = population size.
P = population proportion (0.50 in this method).
ME = desired margin of error (expressed as a proportion).

Because of COVID-19 effects, the researcher employed an online way to disseminate (191) surveys to the respondents via Google form. A total of 181 valid questionnaires were retrieved for statistical analysis, accounting for (94.76%) of all disseminated questionnaires, which is an acceptable percentage for scientific research. Table 1 shows how the study sample was distributed based on demographic factors.

4.3. Research Instrument

The researcher in the current study relied on the questionnaire as the main tool for collecting data. This research used a questionnaire, based on the Likert scale, consisting of five choices ranging from strongly agree and strongly disagree to a relative weight (5–1). The questionnaire was divided into four main sections, as follow:

First Section: concerned with the personal data of the respondents and their companies.

Second Section: the researcher relies on the literature review to establish the mediator variable (financial management) (Al-Joburi et al., 2012; Djatmiko, 2017; Liang et al., 2021; Hikmah et al., 2021).

Table 1: Characteristics of the Study Sample According to the Demographic Variables

Variables	Categories	Frequency	Percentage
Age	20–29 years	102	56.4%
	30–39 years	38	21.0%
	40–49 years	28	15.5%
	50 and above	13	7.2%
	Total	**181**	**100%**
Education Level	Diploma and Less	24	13.3%
	Bachelor's degree	101	55.8%
	Master	50	27.6%
	PhD	6	3.3%
	Total	**181**	**100%**
Experience	Less than 5 years	79	43.6%
	5 less than 10 years	49	27.1%
	10 less than 15 years	29	16.0%
	15 years and more	24	13.3%
	Total	**181**	**100%**
Company Age	Less than 5 years	70	38.7%
	5 less than 10 years	63	34.8%
	10 less than 15 years	48	26.5%
	Total	**181**	**100%**
Company Size	Small	48	26.5%
	Medium	91	50.3%
	Large	42	23.2%
	Total	**181**	**100%**

Third Section: The researcher relies on the literature study to build this instrument, which is concerned with the dependent variable (project performance) and all of its dimensions (project final length, quality, safety, and final cost) (Guracanli et al., 2017; Lu & Liu, 2014; Tengan et al., 2016).

Fourth Section: concerned with the mediator variable (financial management), the researcher depends on the literature review to develop this instrument (Kotb et al., 2018; Omopariola & Windapo, 2019).

4.4. Data Analysis Techniques

For the analysis of the study, data will be analyzed with Statistical Package for the Social Sciences software (SPSS. 25), and Amos software (AMOS 21) through:

1. The descriptive statistics (frequency, percentage, mean and standard deviation).
2. Structural Equation Modeling (SEM) in Amos software.

5. Research Results

5.1. Descriptive Analysis

This section provides a descriptive analysis of the constructs addressed in the present study. In this study, the mean, and standard deviation scores of the 33 items were obtained according to the study variables, as discussed, follows (Table 2).

Table 2 shows the results of the descriptive analysis for the cash flow variation variable with a mean of (3.79) and standard deviation of (0.64), while at the item level, item (7), which states variations in construction cash flows lead to increased difficulties in obtaining financial assistance, came in first place with a mean of (4.16) and standard deviation of (0.75), and item (1), which states errors in project document (Bills of Quantities) causes variations in construction cash flows, came in second place with a mean of (3.65) and standard deviation of (1.00).

Table 3 shows the descriptive analysis results for the project performance variable with a mean of (3.66) and standard deviation of (0.48), while at the dimension level, (quality) dimension ranked first with a mean of (3.82) and standard deviation of (0.66), (project final duration) ranked second with a mean of (3.78) and standard deviation of (0.66), (safety) dimension ranked third with a mean of (3.58) and standard deviation of (0.81), and finally (final cost) dimension ranked fourth with a mean of (3.58) and standard deviation of (0.69).

Table 4 shows the descriptive analysis results for the financial management variable: mean (3.58) and standard deviation (0.81), while at the item level, item (1), which states financial reporting quality has reflected the actual financial status), came in first place with a mean of (3.63) and standard deviation of (0.91), and item (7), which states managerial capability is an important factor of financial planning), came in last place with a mean of (3.53) and standard deviation of (0.91) (0.99).

Table 3: Descriptive Analysis for Project Performance

Rank	No	Dimensions	Mean	SD
2	1	Project Final Duration	3.78	0.66
1	2	Quality	3.82	0.66
3	3	Safety	3.58	0.81
4	4	Final Cost	3.43	0.69
		The average mean score of project performance	3.66	0.48

Table 2: Descriptive Analysis for Cash Flow Variation

Rank	No	Items	Mean	SD
8	1	Errors in project document (Bills of Quantities) causing variations in construction cash flows.	3.65	1.00
7	2	Poor communication among participants causes variations in construction cash flows.	3.67	0.93
5	3	Variations in construction cash flows affect the purchase of stock.	3.72	0.93
6	4	Variations in construction cash flows affect the payment of wages.	3.68	0.93
4	5	Variations in construction cash flows lead to delays in project completion time.	3.75	0.86
3	6	Variations in construction cash flows lead to reduce in profit margin.	3.77	0.86
1	7	Variations in construction cash flows lead to increase difficulties in obtaining financial aids.	4.16	0.75
2	8	Variations in construction cash flows lead to an increase the additional costs.	3.96	0.89
		The average mean score of cash flow variation	3.79	0.64

Table 4: Descriptive Analysis for Financial Management

Rank	No	Items	Mean	SD
1	1	Financial reporting quality has reflected the actual financial status.	3.63	0.91
2	2	Financial reporting disclosure has been conducted frequently.	3.62	0.94
3	3	Working capital management ensures that firms can meet their daily cash budget.	3.61	0.97
5	4	Monitoring the cash conversion cycle is important.	3.54	0.95
4	5	Control activities in firms are detective and preventive.	3.56	1.00
5	6	The monitoring activities have improved financial management.	3.54	0.93
6	7	Managerial capability is an important factor in financial planning.	3.53	0.99
		The average mean score of financial management	3.58	0.81

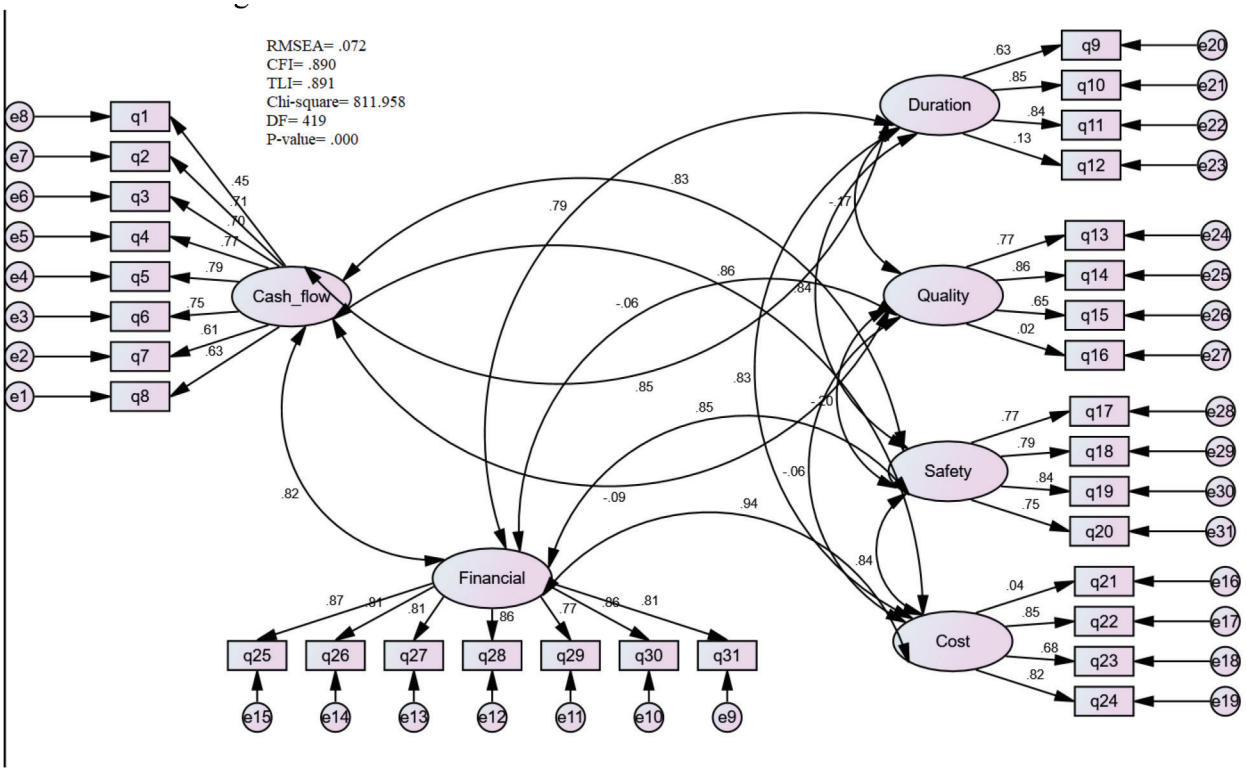

Figure 2: Pooled Confirmatory Factor Analysis Measurement Model

5.2. Measurement Model

Using a pooled CFA method, this study aims to validate the main constructs or influencing factors, user happiness and techno trust. The Pooled-CFA was selected because it is more efficient, thorough, and free of model identification issues (Awang et al., 2015; Awang, 2014). To analyze the correlation among the constructs, all constructions are pooled together and linked using the double-headed arrows, as illustrated in Figure 2.

The assessment of model fit was made by comparing the fitness indexes of this structural model with the threshold indexes from the literature is reported in Table 5.

As shown in Figure 2, the final measurement model consists of 31 items, and fitness indexes (RMSEA, TLI, CFI, and Chisq/df) had achieved the required level, the hypothesis

Table 5: The Assessment of Fit for the Structural Model

Name of Category	Name of Index	Fit Criteria	Level of Acceptance	Comments
Absolute fit	RMSEA	≤0.08	0.072	Meet the required level ≤ 0.08
1. Incremental fit	CFI	0.80 or greater	0.890	Meet the required level ≥ 0.8
	TLI	0.80 or greater	0.891	Meet the required level ≥ 0.8
2. Parsimonious fit	Chisq/df	$1.0 \leq \chi^2 / df \leq 5$	1.937	Meet the required level ≥ 2.0

Table 6: The Regression Path of the Standardised Regression Weights of Constructs

Construct	Path	Construct	Beta Estimate	Standard Error	Critical Region	*P*-value
Project Perform	←	Cash flow variation	0.573	0.036	15.884	***
Financial Management	←	Cash flow variation	0.946	0.063	15.131	***

Table 7: Bootstrapped for Indirect Effect

Mediator	Standardized Indirect Estimate	95% Confidence Interval (CI)	
		Lower Bound (LB)	Upper Bound (UB)
CFV → FM → PP	0.412	0.231	0.407
	Standardized Direct Estimate		
CFV → FM → PP	0.352	0.171	0.369

testing in the following section. This study proposed four hypotheses, there are two direct hypotheses (H1 and H2), and one indirect hypothesis (H3). Specifically, the study seeks to examine the following paths:

Based on the findings in Table 6, the first hypothesis suggested that cash flow variation has a direct impact on project performance ($\beta = 0.573$, $p = 0.000$). To put it another way, when cash flow variation increased by one, project performance increased by 0.573. As a result, the research hypothesis stated above is supported.

Based on the data in Table 6, the second hypothesis suggested that cash flow volatility has a direct impact on financial management ($\beta = 0.946$, $p = 0.000$). To put it another way, when cash flow variance increased by one, financial management increased by 0.946. As a result, the research hypothesis stated above is supported.

5.3. Mediation Hypotheses

From the perspective of Kuwaiti contractors, the mediation hypothesis suggested that financial management plays a mediating function in the relationship between cash flow fluctuation and project performance. The researcher looked at both the direct and indirect effects of cash flow volatility in this study. If the direct effect of influence variables on project performance is considerable, the researcher may be able to identify whether financial management (FM) mediated the relationship between cash flow variation (CFV) and project performance (PP). A mediator's role is to give an indirect effect of cash flow changes on project performance. As a result, the researcher used bootstrapping to investigate the mediation effect, as described below.

5.4. Mediation Effect Using Bootstrap Approach

This study applied Preacher and Hayes (2008) method of bootstrapping the indirect effect to determine the presence of mediation effect, where mediation occurred when the lower bound (LB) and upper bound (UB) values of indirect effect do not straddle a 0 in between.

As shown in Table 7 and Figure 3, the lower bound was 0.231 and the upper bound was 0.407 (both upper and lower bounds are in the positive zone). That is to say, from the perspective of Kuwaiti contractors, financial management plays a mediated role in the relationship between cash flow fluctuation and project performance.

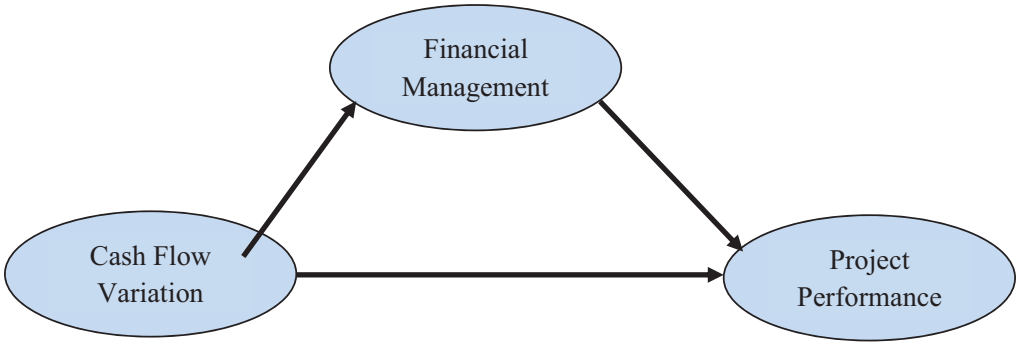

Figure 3: The Mediating Role of Financial Management

6. Conclusion and Recommendations

Cash flow is a good indicator of a construction contractor's financial health, and cash flow issues are a common cause of project failure. From the perspective of contractors in Kuwait, this study studied contractors' perceptions of the effects of cash flows on the performance of construction projects, as well as the mediating function of financial management in the relationship between cash flow volatility and project performance. To get responses from construction professionals, the study used a systematic literature review and a cross-sectional questionnaire survey.

It emerged from the study that: respondents indicated that construction projects suffer from the problem of differing cash flows, as they emphasized that there are multiple reasons for differing cash flows in construction projects, including lack of technical skills, different meanings of specifications, incomplete information at tender stage, inadequate supplier management, and errors in project document (Bills of Quantities).

Aside from that, respondents said that cash flow differences affect all stages of construction projects, including acquiring inventory, raw materials, and paying salaries, causing delays in project completion time, lowering profit margins, and making it more difficult to acquire financial aid. Respondents also indicated that they are concerned about the success of construction projects, stating that they focus on sticking to the project's deadline, ensuring the security and safety of all project workers, and completing construction projects to a high standard of quality.

Furthermore, the study findings revealed that cash flow variation has a positive statistically significant effect on project performance from the perspective of Kuwaiti contractors at the significance level ($\alpha \leq 0.05$), and that there is a mediated role of financial management in the relationship between cash flow variation and project performance. As a result, it's critical to pay attention to cash flow issues in construction projects and try to understand the elements that affect them to alleviate cash flow issues and promote successful construction projects.

This is due to the relevance of the issue of cash flow, which is one of the most essential activities in the management of building projects, and the importance of accurately calculating this issue so that the owner and contractor can determine and arrange their financial needs.

The researcher also attributes this result to the fact that cash flow has a significant impact on all aspects of construction projects because it is responsible for determining the project's future obligations, determining the expected cost of the project, and anticipating the potential cost of the resources that will be required to complete all project work. As a result, it is necessary to pay attention to and focus on the issue of cash flow, as evidenced by the significant impact.

Based on the study results, the researcher recommended that:

1. The necessity of a better understanding of cash flow by contractors to schedule project activities correctly and efficiently.
2. The need to develop an accurate cash flow model with the aim of helping contractors and academics forecast cash flow before and during construction.
3. More empirical research, using actual data, is needed to better understand the impact of owner financial management on cash flow.
4. Further research into the effect of cash flow forecasting (planning) and financial management (control) on various construction activities to enable the establishment of precautionary measures against the impact of cash flow problems if they occur on a project.

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