

MEASURING THE FACTOR AFFECTING IN CASH FLOW IN CONSTRUCTION PROJECT BASED ON THEIR IMPACT ON PROJECT PERFORMANCE

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ABSTRACT: Construction projects are well known for their complexity and ambiguity. These projects carry out higher risk than traditional ones because they entail high capital outlays and intricate site conditions. Poor financial management of these projects may lead to bankruptcy; therefore, effective cash flow management is essential. Although the peculiar characteristics of construction projects, the accuracy of cash flow forecasting has been a long lasting problem. The paper aims to discuss these issues. Many unforeseen factors affect the cash flow forecasting of construction projects. Therefore, the objective of the presented research in this paper is to examine the impact of these factors on construction industry's cash flow. Results show that the most significant factors are: Change of progress payment duration, Large retention percent, Change of labor and staff wages, Loan payment, Bank loan Interest rate, Relation with owner, Replacement of deflection work, Over and under measurement, Failure to sub-contractor, Renting and buying equipment, Poor design, Inaccurate bid item, Weather condition, Number of claim. Keeping these factors and their impact in mind, some suggestions were given to make the cash flow effective. With all these suggestions, cash flow problems can be overcome to some extent and a construction industry can be saved from bankruptcy. These are some simple tips that can be easily implemented while making cash flow.

INTRODUCTION

Advancement projects, i.e., structures, turnpikes, ranges, underground utilities and waste offices, mechanical endeavors, etc, are known for their high peril and weakness, particularly, at the statement time of such exercises where the proportion of adventure's information is extraordinarily confined. Project worker can't make due in the genuine advancement industry without incredible income the chiefs. Income is the balance of got and burned through cash on an endeavor over a specific term. Studies and examinations have shown that absence of liquidity is a significant issue causing disappointment of development projects (Al-Issa and Zayed, 2007). Just 26% of organizations began in 1976 were as yet in business in 1988 (Bashford, 1996). According to 2005 Biz Miner industry reports, out of the 853,372 advancement distinguishing strength trade laborers for enlist, working in 2002, only 610,357 were at this point in business in 2004, with a 28.5 percent. According to US measurements report, advancement associations have a higher disillusionment rate than most associations (14 percent). Companies may have the choice to keep up their business for some time without showing any advantage, or even with an ephemeral mishap; regardless, they may slump due to nonattendance of liquidity during improvement, whether or not they have a fair spending synopsis. Poor financial position has provoked 26.71 percent of the advancement business disillusionments during the earlier decade (Arditi and Chotibhongs, 2005). Therefore, all together for a specialist for recruit to get powerful in the improvement competition, a strong pay is a basic limit. Pay control, i.e., cash in/out and assessing, being developed agreements is urgent for project laborers. Money related organization has for quite a while been seen as a huge organization instrument (Davis and Carr, 1992). If there are any colossal mistakes among veritable and measure pay regards, the laborers for employ need to invigorate the undertaking mean to arrange with the surveyed condition immediately. If there are any huge irregularities among real and decided pay regards, the laborers for enlist need to invigorate the endeavor plan to facilitate with the evaluated situation immediately. The principle gadget, which is available for project laborers to control the money related pieces of their business, is pay charts. The principle instrument, which is open for laborers for recruit to control the financial pieces of their business, is pay charts. With satisfactory data on pay guaging, the undertaking laborer could gainfully and definitely administer pay during improvement to thwart extra expenses and avoid project breakdown.

LITERATURE REVIEW

(Cui, Hastak, & Halpin, 2010) Built up a framework elements model for project incomes utilizing Vensim DSS Version 5.5 and mimicked project income the executive's situations for various income the board procedures, for example, frontloading, back loading, and ideal money balance methodologies. Additionally, extraordinary money the board arrangements, for

example, overbilling and under-charging, subcontracting, exchange credit and so on were read for a commonplace case. Effect of various procedures on necessity of exchange overdraft was examined to track down the most fitting technique for limiting the overdraft.

(Bhunia and Khan, 2011) Attempted to examine the relationship between the liquidity the board and benefit of 230 Indian private area steel organizations. The time frame covered under the examination stretches out to nine years going from 2002 to 2010. Liquidity the board pointers and productivity markers were displayed as a direct relapse framework in different relationship and relapse examination. Spellbinding insights uncovered that liquidity and dissolvability position as far as obligation was agreeable yet liquidity position no affected productivity. Various relapse tests affirmed a lower level of relationship between the functioning capital administration and benefit.

(Doloi, Sawhney, Iyer, & Rentala, 2012) Investigating reasons for delays in Indian development projects have recognized different task related, site related, measure related, human related, authority related and specialized issue related credits for project defers assembled based on before research completed by different scientists on the theme. The ascribes were positioned by Relative Importance Index (RII) determined based on loads given to each credit by the respondent. One of the credits recognized under specialized Issues as 'Monetary Constraints of Contractors' was positioned third among 45 ascribes. The significance of 'monetary requirement' isn't obvious from the paper and subsequently can't be identified with helpless income the board.

(Abdul Razaq & Ibrahim, 2012) An investigation analyzed the acts of income anticipating by project workers in Nigeria and presumed that the act of income determining by project workers in Nigeria was not reliable. The individuals who rehearsed it didn't have a suitable method of doing it, while others didn't assume it merits careful thought. Most workers for hire showed a casual demeanor towards the training as no conventional strategy was installed in their organization strategy to estimate income. The individuals who occupied with the training as an organization strategy didn't cling rigorously to ideas by scientists to smooth out rehearses alongside characterized exercises.

(Patil, Gupta, Deasi, & Sajane, 2013) In an investigation about reasons for delay in Indian transportation foundation projects have distinguished 64 reasons for project delays and have positioned them utilizing RII. In any case, none of the causes is identified with monetary parts of the task.

(Pai & Bharath, 2013) In an examination on Indian establishment projects perceived 74 exceptional explanations behind project delay in different get-togethers like assignment, owners, and laborers for recruit, master etc. The audit responses were analyzed by registering 'repeat list' considering repeat of occasion, 'reality list' taking into account earnestness of occasion. An 'importance document' was described as the increase of repeat and reality records. The factors were arranged in incredibly essential, uncommonly fundamental and fundamental dependent on importance factor inside each get-together. 'Inconveniences in financing project by laborer for enlist' was viewed as a very essential factor.

(Marko Milojevic & Dragan Miletic, 2014) this examination depicts the information on incomes and utilization of income proclamations in regard of money necessities of organizations working in the Republic of Serbia taken from a delegate test. In regard of the income articulation being correlative to other fiscal summaries, the outcomes show that most of respondents from the organizations having persistent and occasional money necessities communicated concurrence with the position that income explanation is corresponding to pay proclamation and asset report, Respondents from the organizations that don't characterize their money prerequisites communicated conflict with the said position.

(Augustin Purnuá & Constança-Nicoleta Bodeabc, 2015) Development area is defenseless against monetary changes, particularly during downturn periods because of the great capital expenses, cost adaptability and high rivalry restricting the cost. The progressions of the business climate, regularly connected with deficiency of assets, swapping scale vacillation and political insecurity increment the development projects monetary dangers. The paper presents the experience acquired in the expert program of Project Management in Construction held in the Technical University of Civil Engineering Bucharest. In view of the fundamental global venture the board fitness principles and applicable instructive encounters, the creators planned a reenactment stage.

(Augustin Purnusa & Constanța-Nicoleta Bodeab, 2016) The consequences of this investigation recommend that the development organizations ought to painstakingly consider various variables that can impact choices both in the bid-delicate stage, yet particularly in the execution period of framework projects. The ideal and homogeneous conditions imagined by the

overall contracting provisos required a critical exertion of dissecting and understanding the elements issues of monetary nature looked by workers for hire subsequent to marking the agreement without accounts however hazard occasions and vulnerabilities that portray completely these task classes.

(R.Rajasekher, 2017) In view of my investigation the accompanying ends have been drawn. Distinguished the seven variables which are significant markers of the development business they are liquidity factor, action factor, long haul dissolvability, proficiency, benefit, resource the executives, stock elements. The explanation may be persistent monetary emergencies and still nonstop the stagnation. The presentation levels of the Indian development industry shows that pioneer position of the development area have 40% of organizations under Zero execution index. The government ought to break down the monetary condition of the development business earnestly and embrace related activity. From separate investigation shows that 45 % organizations in safe zone, 5% of organizations in Distress zone and staying 55% organizations under ill-defined situation.

(Samer Eyelid & Gasser Galan Ali, 2017) Taking the perspective of the worker for hire in a development project, the created model and Graphical User Interface (GUI) can be utilized to perform examination and advancement of the income of an arrangement of development project. The model mulls over the time estimation of cash, determined with a financing cost appointed to the activities by the client, this could be the expansion rate or the base alluring pace of return (MARR) of the project worker. Advancement is performed with the target of augmenting the net present worth (NPV) for the tasks in general, limited toward the beginning of the portfolio.

(Tarek Rayed & Yaqiong Liu, 2018) Development projects are notable for their intricacy and uncertainty. These activities do higher danger than conventional ones since they involve high capital costs and perplexing site conditions. Poor monetary administration of these tasks may prompt insolvency; in this way, viable income the executives is fundamental. Albeit the unconventional attributes of development projects, the precision of income anticipating has been a durable issue. The paper intends to talk about these issues. The execution of the created models are restricted to not many contextual investigation projects in testing the models. In any case, the created models and structure are sound for future improvement. They are considered as a significant advance toward a more extensive income arranging.

(Selin Gundes, Nur Atakul & Fork Buyukyoran, 2019) In spite of the fact that money has gotten an extensive consideration in everyday account and the executives writing, the idea of development money has not actually acquired an unmistakable situation among concentrates as a key examination topic. The current paper depended on an itemized investigation of 259 archives to uncover patterns, examples and efficiency in practically 50 years on development money research. Taking a gander at the entire time frame it very well may be seen that the quantity of distributions has reliably expanded.

(Jarosław Konior & Mariusz Szostak, 2020) An intensive investigation of the distributions of the creators referred to in the paper, just as the creators' experience and gotten results prompts the end that the recently proposed models of gauging the S-bend generally digress from the truth, are excessively convoluted, and hence, not useful in arranging and overseeing development projects. This is on the grounds that the combined expense bends, because of their uniqueness, are extraordinary. Every speculation project has an individual character. Development projects are situated in different areas and in an alternate geological climate.

(Sara Ayman, Abdel Rahman & Mustafa Hussein, 2021) The model proposes various ways that endeavor to beat the deficiency in income; first by limiting the measure of financing needed through moving the exercises with slack to upgrade the income, without expanding the undertaking span, at that point assessing distinctive financing options; specifically long and transient credits. The result of the model is a changed income for the undertaking with less financing needed from the worker for hire, and plausible timetables of financing inflow and outpouring dependent on the best financing elective, that endeavors to cover the absence of money with the base financing cost. Also, the model furnishes the client with a debatable bid elective that decides the ideal expansion in settlement ahead of time that will conquer the money lack, without getting reserves. The model has been tried and approved on a contextual investigation, and an affectability examination has been performed.

3.0 RESEARCH METHODOLOGY

Literature survey: it includes a few components:

- Study past income determining models to discover their benefits and limits;

- Identify and gather the vulnerability factors and classify them

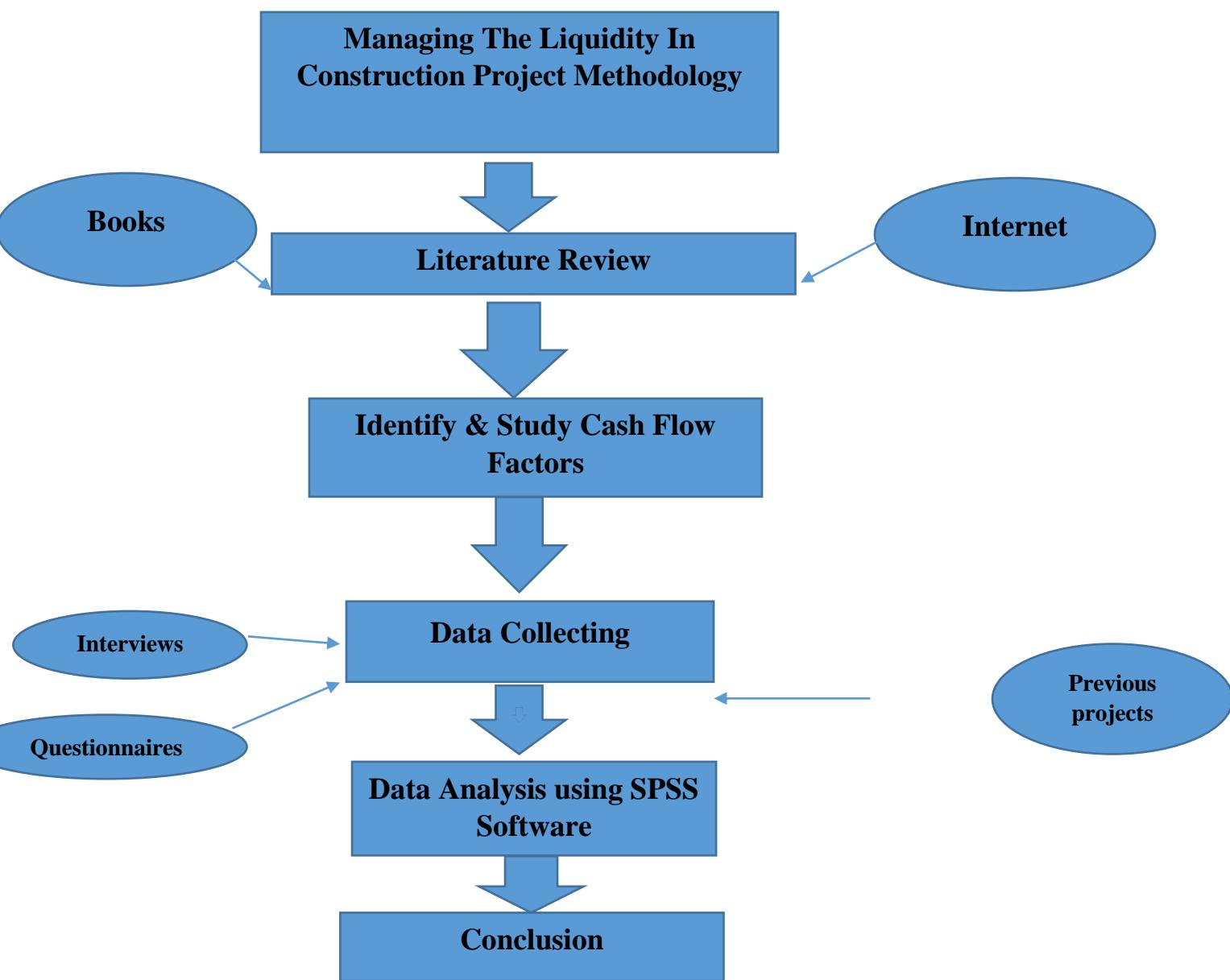
Identify & Study Cash Flow Factors- There is the number of factor of identification to the help of literature review and internet.

Data collection: a questionnaire is designed to investigate the factors' impact on cash flow from construction management experts.

Data analysis: data collected from questionnaires are analyzed for Cronbach's Alpha (α) using SPSS Statistics

Conclusions: research outcomes are summarized and limitations are briefly discussed.

Research Methodology Flow Chart



Financial management	Sub-contractor	During construction
i. Change of progress payment duration	i. Decision to sub-contractor	i. Mistake in executing the work
ii. Change of progress payment condition	ii. measurement Over and under	ii. Lack of adequate insurance
iii. Receiving front payment	iii. Failure to sub-contractor	iii. Replacement of deflection work
iv. Large retention percent	iv. Renting and buying equipment	iv. Large project duration increase/decrease
v. Delay in releasing retention	Supplies	v. Small project duration increase/decrease
vi. Financial position	i. Delay to making payment	vi. Project delayed
vii. Loan payment	ii. Procurement problem	vii. Material and equipment shortages
viii. Payment of material	iii. Delay to delivery	viii. Lack of skilled labor
ix. Over work measurement	iv. Price change	ix. Improper planning and management
x. Under work measurement	Prior construction	x. Under work measurement
xi. Change of labor and staff wages	i. Poor design	xi. Over work measurement
xii. Payment for suppliers	ii. Inaccurate bid item	xii. Work execution errors
xiii. Delayed payment for suppliers	iii. Estimating strategies	Others
xiv. Selling price adjustment	iv. Cash flow forecasting	i. Weather condition
xv. Claims	v. Competition	ii. Positive discharge orders-additions work
xvi. Loan payment	Communication skills	iii. Negative change order-omit work
xvii. Withholding tax	i. Contractor owner disputes	iv. Inability to manage change order
xviii. Bank loan Interest rate	ii. Poor communication contractor staff	v. Number of claim
	iii. Relation with owner	vi. Covid-19
	iv. Relation with consultant team	

DATA COLLECTION

An information assortment plan is created to get the necessary data for the created research. After a far reaching writing survey and a few meetings with development engineers/specialists, 53 elements are distinguished as touchy to income in development projects. To this end, information are gathered from specialists and designers through a survey and on location interviews. These elements are sorted to encourage displaying their impact on income and figure this effect.

Data are also collected from a commercial building construction project located in Lucknow India . The project lasted seven months started in April 2019 and ends in September 2020. Monthly interest of 0.5 percent was applied to only negative cash flow. Front-end loading was not allowed in this project. The main construction activities of this project include, earth workexcavation, foundation, piler, walls, roof, fabrication interior decoration etc . According to the project manager, Change of progress payment duration, Large retention percent, Change of labor and staff wages, Loan payment, Bank loan Interest rate, Relation with owner, Replacement of deflection work, Over and under measurement, Failure to sub-contractor, Renting and buying 23 equipment, Poor design, Inaccurate bid item, Weather condition, Number of claim the factors that affected this project. This factor affects all types of projects in India in general. So we will arrange these factors according to the rank by using the software SPSS.

DATA ANALYSIS

Analysis for Cronbach's Alpha (α) using SPSS Statistics

$$\rho_T = \frac{k^2 \overline{\sigma_{ij}}}{\sigma_X^2}$$

ρ_T = tau-equivalent reliability

k = number of items

σ_{ij} = covariance between X_i and X_j

σ_X^2 = item variances and inter-item covariances

Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when you have multiple Liker questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable. Cronbach's alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when you have multiple Liker questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable.

Reliability of data by contractor & engineer

Reliability Statistics

Cronbach's Alpha		
Cronbach's Alpha	Items	N of Items
.816	.816	14

3.8.3 Item-Total Statistics by contractor & engineer

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Change of progress payment duration	49.26	56.366	.500	.469	.800
Large retention percent	48.86	58.713	.431	.421	.805
Change of labor and staff wages	48.97	57.436	.513	.619	.800
Loan payment	49.03	57.323	.411	.544	.808
Bank loan Interest rate	48.89	60.466	.328	.397	.812
Relation with owner	49.00	57.183	.464	.570	.803
Replacement of deflection work	48.78	59.753	.372	.359	.809
Over and under measurement	49.08	58.754	.345	.342	.813
Failure to sub-contractor	48.94	60.645	.357	.336	.810
Renting and buying equipment	49.26	54.169	.514	.643	.799
Poor design	48.81	60.694	.387	.502	.809
Inaccurate bid item	49.21	54.674	.598	.671	.792
Weather condition	48.69	61.539	.338	.507	.811
Number of claim	48.96	55.702	.617	.522	.792

Conclusion

The presented research in this paper identifying the factor which are effected of cash flow of construction industry. In all, 53 factors that affect project's cash flow have been identified and studied. Variability and uncertainty in the effect of these out of 53 factors we collected data about the main 14 factors coming in the project of Lucknow. Probability distributions for the effect and weight of these factors are constructed based upon the collected data from questionnaires, interviews and phone calls with practitioners. These collected data were converted to Cronbach alpha value with the help of SPSS. Cronbach alpha value of data collected contractor and client was found .816 hence data is reliable as value is between 0.7 to 1. With the help of SPSS software, these 14 factors were arranged on the basis of their cash flow impact.

Keeping these factors and their impact in mind, some suggestions were given to make the cash flow effective. With all these suggestions, cash flow problems can be overcome to some extent and a construction industry can be saved from bankruptcy. These are some simple tips that can be easily implemented while making cash flow.

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